Vol. XXVII.—No. 192 March, 1946

THE

MINERALOGICAL MAGAZINE

AND

Journal of The Mineralogical Society.

(INSTITUTED FEBRUARY 3, 1876.)

WITH A SEPARATELY-PAGED APPENDIX OF

MINERALOGICAL ABSTRACTS

EDITED BY L. J. SPENCER, F.R.S.

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LONDON
GEOFFREY CUMBERLEGE, OXFORD UNIVERSITY PRESS
AMEN HOUSE, WARWICK SQUARE, E.C. 4

1946

Price 6s. net.
Annual Subscription for four numbers, Post free, 20s.

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PROCEEDINGS

OF THE

MINERALOGICAL SOCIETY

(1945)

EXCERPT MINUTES OF COUNCIL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., January 25, 1945, *at* 2 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Messrs. Peter Aubrey Sabine, Robert Dudley Sampson Shrimpton, and Robert Shell Thompson were proposed and provisionally elected Ordinary Members of the Society. The death of Professor J. Ellis Thomson was reported.

Reports were received from the Treasurer and the Editor, and the Treasurer presented the audited accounts for 1944, which were adopted. It was decided to write off the subscriptions due from members in enemy-occupied countries for the current year.

The supply of literature for war-damaged libraries was considered.

GENERAL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., January 25, 1945, *at* 3.30 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Forty Members and fourteen Visitors were present.

The elections of Messrs. P. A. Sabine, R. D. S. Shrimpton, and R. M. Thompson as Ordinary Members of the Society were confirmed.

Lieut.-Col. J. V. Ramsden delivered a lecture on 'Practical barytes mining in Cornwall' (vol. 27, p. 75).

EXCERPT MINUTES OF COUNCIL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., March 22, 1945, *at* 2.15 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Messrs. William Anderson, Paul Desmond Blake, Tha Hla, Ivan Kostov, Malcolm David Samuel Lewis, Igor Serge Loupekine, William Pulfrey, and James Edward Taylor were proposed and provisionally elected Ordinary Members of the Society.

Reports were received from the Treasurer and the Editor.

The President reported that two of the sets of the *Magazine* available distribution to war-damaged libraries were being sent to Czechoslovakia Poland.

GENERAL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., March 22, 1945, *at* 3.30 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Twenty-nine Members and thirteen Visitors were present.

The elections of Messrs. W. Anderson, P. D. Blake, Tha Hla, I. Ke M. D. S. Lewis, I. S. Loupekine, W. Pulfrey, and J. H. Taylor as Ord Members of the Society were confirmed.

Dr. W. Campbell Smith exhibited photographs taken by Mr. Arthur Cha in the Kamasia Hills and the Elgeyo escarpment district in Kenya Colony.

The following papers were read:

1. The shape of reflections on X-ray, single-crystal photographs: by Dr. Kath Lonsdale (vol. 27, p. 112).

2. A magnesian chamosite from the Wenlock Limestone of Wickwar, Glouce shire: by Mr. F. A. Bannister and Prof. W. F. Whittard (vol. 27, p. 99).

3. Myrmekite in graphic granite and in vein perthite: by Dr. Edmon Spencer (read by Dr. David Williams) (vol. 27, p. 79).

4. Electrodialysis of mineral silicates: an experimental study of rock-weat ing: by Mr. Tha Hla (vol. 27, p. 137).

EXCERPT MINUTES OF COUNCIL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., June 7, 1945, *at* 2.15 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Messrs. Duncan McConnell, Hans Jurie Nel, and James Bowman Nelson proposed and provisionally elected Ordinary Members of the Society. Dr. Wa mar Theodore Schaller was elected an Honorary Member, subject to confirma at the ensuing general meeting. The death of Prof. A. E. Fersman, Hono Member, was reported.

Reports were received from the Treasurer and the Editor. It was agreed the number of free reprints allowed to authors of papers should be increased f 25 to the pre-war figure of 50.

The list of Officers and Council for 1945–6 was considered. The following due to retire: President, Mr. F. N. Ashcroft; Ordinary Members of Cou Mr. C. E. N. Bromehead, Mr. G. E. Howling, Mr. R. C. Spiller, and Dr. Campbell Smith. The following were nominated for election at the Annive

ting in November 1945: as President, Dr. W. Campbell Smith; as Ordinary
nbers of Council, Dr. M. H. Hey, Dr. J. H. Taylor, Dr. A. E. J. Vickers, and
f. L. R. Wager.

GENERAL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., June 7, 1945, at 3.30 p.m.

Mr. F. N. Ashcroft, President, in the Chair.

hirty-four Members and three Visitors were present.
he elections of Dr. W. T. Schaller as an Honorary Member, and of Messrs. D.
Connell, H. J. Nel, and J. B. Nelson as Ordinary Members of the Society were
firmed.
r. A. E. J. Vickers and Mr. D. G. A. Whitten exhibited minerals from the
ydrite mine at Billingham, Co. Durham.
he following papers were read:
. The atomic structure of fluor-apatite and its relation to that of tooth and
e material: by Dr. C. A. Beevers and Mr. D. B. McIntyre (read by Mr. F. A.
nister).
. Whitlockite from Sebdon, Oran, Algeria: by Mr. F. A. Bannister, with
mical analysis by Miss Hilda Bennett.
. On the petrology of the ultrabasic and basic plutonic rocks of the Isle of
n: by Mr. S. I. Tomkeieff (taken as read) (vol. 27, p. 127).

EXCERPT MINUTES OF COUNCIL MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., November 1, 1945, at 3.30 p.m.

Mr. F. N. Ashcroft, President, in the Chair.

Prof. Jean Orcel (Paris), Dr. Aleksei Vasilievich Shubnikov (Moscow), and
f. František Slavík (Praha) were provisionally elected Honorary Members of
Society; and Dr. Cecil Arnold Beevers, Dr. Edward Joseph Gübelin,
Edward Harold Jaques, Mr. Charles Lessner, Mr. Harold Leslie Nixon,
Jiří Paclt, Dr. Denis Parker Riley, Mr. John Stuart Webb, and Mr. Maurice
ngsley Wells were provisionally elected Ordinary Members. The deaths of
ss Catherine A. Raisin and Mr. Harold Elliott were reported.
Reports were received from the Treasurer and the Editor. The Secretary read
draft of the Annual Report of Council, which was approved.
Mr. F. A. Bannister and Dr. S. E. Hollingworth were appointed auditors for
6. The following dates of 1946 meetings were approved, subject to confirma-
n by the Geological Society: Thursdays, January 24, March 28, June 6, and
vember 7.

GENERAL (ANNIVERSARY) MEETING

Held in the Apartments of the Geological Society, Burlington House, London, W., November 1, 1945, *at* 5 *p.m.*

Mr. F. N. Ashcroft, President, in the Chair.

Thirty-six Members and eight Visitors were present.

Mr. B. W. Anderson and Mr. G. H. Osborn were appointed as scrutineers of the voting papers for the election of Officers and Council.

The elections of Prof. J. Orcel, Dr. A. V. Shubnikov, and Prof. F. Slavík as Honorary Members, and of Dr. C. A. Beevers, Dr. E. J. Gübelin, Mr. E. H. Jaques, Mr. C. Lessner, Mr. H. L. Nixon, Mr. J. Paclt, Dr. D. P. Riley, Mr. J. S. Webb, and Mr. M. K. Wells as Ordinary Members were confirmed.

The General Secretary read the following:

ANNUAL REPORT OF THE COUNCIL FOR 1944–5

Membership.—Including 10 Ordinary Members whose whereabouts are at present unknown, the total membership on October 31 was 288 against 275 on October 31, 1944. Seventeen new members have been elected during the year. Dr. Waldemar T. Schaller, an Ordinary Member since 1912, was elected an Honorary Member on June 7, 1945. The Society has lost by death one Honorary Member, Dr. A. E. Fersman, and three Ordinary Members, Mr. H. Elliott, Dr. Catherine A. Raisin, and Prof. J. Ellis Thomson. On October 31 the membership consisted of 5 Honorary Members and 283 Ordinary Members, of whom 47 were Life Members.

Since the liberation of those countries that have suffered from enemy occupation the Council has endeavoured to regain touch with the members of the Society resident therein, and is glad to be able to report that contact has been regained with the following: *France*, Prof. A. Lacroix (Honorary Member), Col. N. T. Belaiew, Monsieur N. Boubée; *Belgium*, Prof. H. J. F. Buttgenbach, Dr. J. L. E. Drugman, Prof. A. Schoep; *Norway*, Prof. T. F. W. Barth. Indirect information has been received that Col. J. P. L. Vésignié (France) and Dr. M. J. L. Solignac (Tunis) are alive and well, but direct contact has not yet been established with them. No information is to hand relative to Prof. S. Kreutz (Poland). Contact has also been established with various kindred institutions in the countries referred to.

Meetings.—At the four meetings held during the session 1944–5 the total attendance was 142 members and 32 guests. The average attendance of 43 is slightly below that of last session. At these meetings 11 papers have been read, one lecture delivered, and 3 exhibits shown.

Publications.—Four numbers (186–189) of the *Mineralogical Magazine* have been issued during the year and have contained the Proceedings in 10 pages, 10 papers in 65 pages, with 4 plates and 15 text-figures, and 406 abstracts in 88 pages.

Financial.—The accounts for the calendar year 1944, published in the March number of the *Magazine*, showed an excess of assets (exclusive of the stock of the *Magazine* and of the Society's other effects) over liabilities of £3010. 16*s.* 9*d.* This figure, however, is not comparable with that shown in the accounts for 1943, as the latter does not include the value of the securities then allocated to the Composition Fees Account. The value of the securities standing in the name of the Custodian Trustee was on December 31, 1944, General Reserve £2509. 5*s.* 3*d.*, Miers Memorial Fund £375. 0*s.* 0*d.*

The cash at Bankers, in the Post Office Savings Bank, and in hand, credited to the General Purposes Account on January 1, 1945, amounted to £483. 3*s.* 1*d.* against £381. 9*s.* 3*d.* at the beginning of 1944, and that credited to the Miers Memorial Fund to £28. 0*s.* 6*d.* The undischarged liabilities at the close of 1944, estimated in January at £61. 13*s.* 3*d.*, amounted to £65. 3*s.* 9*d.*, against £118. 8*s.* 4*d.* at the close of 1943.

The receipts from annual subscriptions have been well maintained, and from January 1 to October 31, 1945, amounted to £203. 5*s.* 0*d.* in respect of annual subscriptions for 1945, as arrears £18. 7*s.* 11*d.* and in advance for 1946 £2. 4*s.* 9*d.* The receipts from the Society's publisher for sales of the *Mineralogical Magazine* show a substantial increase over those for 1944, being £228. 6*s.* 6*d.* against £190. 15*s.* 5*d.*

e expenditure on the *Magazine* has continued to be restricted. The actual payments in t thereof made in 1944 amounted to £342. 17*s*. 6*d*. against £215. 5*s*. 3*d*. in 1943. The outing liabilities at the close of these years in respect of the *Magazine* were, 1944 £61. 10*s*. 9*d*., £118. 8*s*. 4*d*. The expenditure on nos. 184–187 of the *Magazine*, i.e. those due for issue in was £285. 19*s*. 11*d*. against £333. 13*s*. 10*d*. on the previous four numbers.

e Composition Fees, totalling £68. 5*s*. 0*d*., have been received and invested.

nations to the Miers Memorial Fund amounting to £13. 9*s*. 0*d*. have been received since ginning of the year, and the sum of £35. 0*s*. 0*d*. has been added to the capital of the Fund nvested.

e cash available on October 31 was General Purposes Account £746. 0*s*. 7*d*. against 19*s*. 11*d*. on October 31, 1944, Miers Memorial Fund £17. 16*s*. 7*d*. The accounts for the and June numbers of the *Magazine* have been settled. The outgoings for the remainder year, provided it is possible to settle the accounts for both the September and December ers of the *Magazine* before the close of the year, are estimated at about £280, and the ts at about £177. On this basis the cash available for future use at the close of the year ding that standing to the credit of the Miers Memorial Fund) should be about £643.

eral.—The Petrological Microscope Committee has issued during the session two reports essential characteristics of petrological microscopes which have been submitted to the ry of Supply and to the British Scientific Instrument Research Association.

e adoption of the Annual Report was proposed and seconded, and carried imously.

vote of thanks to the Geological Society for the use of its apartments was osed and seconded, and carried with acclamation.

vote of thanks to the retiring President and Ordinary Members of Council proposed and seconded, and carried unanimously.

e scrutineers reported that 25 ballot papers had been returned and examined hat the following list as nominated by the Council had been approved and accordingly duly elected for 1945–6:

lent. Lt.-Col. W. Campbell Smith, M.C., T.D., M.A., Sc.D., F.G.S.

Presidents. Sir Lewis L. Fermor, O.B.E., D.Sc., F.R.S.; Prof. W. R. Jones, D.Sc., .M.M., F.G.S.

urer. Dr. A. J. Bull, M.Sc., Ph.D., F.G.S.

al Secretary. Dr. G. F. Claringbull, B.Sc., Ph.D., F.G.S.

n Secretary. Sir Thomas H. Holland, K.C.S.I., K.C.I.E., D.Sc., LL.D., F.R.S.

of the Journal. Dr. L. J. Spencer, C.B.E., M.A., Sc.D., F.R.S.

Ordinary Members of Council

E. Hollingworth, M.A., D.Sc., F.G.S.
E. Marshall, B.Sc., Ph.D., F.G.S.
C. Phillips, M.A., Ph.D., F.G.S.
K. Wells, D.Sc., F.G.S.
Broughton-Edge, M.B.E., B.Sc., I.I.M.M., F.G.S.
C. Dunham, B.Sc., Ph.D., S.D., I.I.M.M., F.G.S.
Prof. W. T. Gordon, M.A., D.Sc., F.R.S.E., F.G.S.
Dr. David Williams, M.Sc., Ph.D., M.I.M.M., F.G.S.
Dr. M. H. Hey, M.A., D.Sc., F.C.S.
Dr. J. H. Taylor, B.Sc., Ph.D., F.G.S.
Dr. A. E. J. Vickers, M.Sc., Ph.D., F.R.I.C., F.G.S.
Prof. L. R. Wager, M.A., Sc.D., F.G.S.

. E. P. Bottley exhibited specimens of crystallized gold from the Rezende , Southern Rhodesia, and other minerals.

e following papers were read:

Simpsonite and other tantalates from Bikita, Southern Rhodesia: by . M. Macgregor (read by Dr. F. C. Phillips) (vol. 27, p. 157).

[*continued on p. xxxvi*]

ABSTRACT OF RECEIPTS AND PAYMENTS

GENERAL PUR

Receipts	£	s.	d.	£	s.	d.
By Balances brought forward from 1944—						
1. At Bankers:						
(a) On Deposit Account	110	0	0			
(b) On Current Account	126	5	0			
2. In Post Office Savings Bank	246	17	6			
3. In Office	0	0	7			
				483	3	1
Entrance Fees				24	3	0
Annual Subscriptions—						
1. Current Year	207	9	0			
2. Arrears	18	7	11			
3. Advance	12	14	9			
				238	11	8
Sale of Publications—						
1. By Publisher, April 1, 1944–March 31, 1945. Sales at subscription rate £304. 5*s*. 0*d*. and other sales £16. 18*s*. 0*d*. less trade discount and commission £81. 13*s*. 11*d*. and distribution charges £11. 2*s*. 7*d*.	228	6	6			
2. By Custodian of Stock, 1945, £129. 6*s*. 6*d*. less distribution charges £3. 15*s*. 4*d*.	125	11	2			
				353	17	8
Advertisement Fees £13. 7*s*. 10*d*. less commission £2. 13*s*. 7*d*.				10	14	3
Interest on Investments, including Income Tax recovered—						
1. £1685 3½% War Loan, 1952 and after	58	19	6			
2. £105 4% Consolidated Loan, 1957	4	4	0			
3. £100 4% Funding Loan, 1960–90	4	0	0			
4. £146. 10*s*. 0*d*. 3% War Loan, 1955–59	4	7	8			
5. £26 3% Conversion Loan, 1948–53.	0	15	6			
6. £205 3% Defence Bonds	3	3	4			
7. £250 3% Savings Bonds, 1960–70	7	10	0			
				83	0	0
Deposit Interest—						
1. Bankers	0	1	1			
2. Post Office Savings Bank	10	10	6			
				10	11	7
Small Receipts				0	10	4
Donations for Illustrations				15	0	0
				£1219	11	7

IETY

THE YEAR ENDING DECEMBER 31, 1945

S ACCOUNT

Payments	£	s.	d.	£	s.	d.
nting and distributing the Mineralogical Magazine, Nos. 187–191 (Oxford University Press)—						
Printing	349	16	0			
Illustrations	66	8	3			
Authors' Separate Copies (Nos. 187–190)	13	5	0			
Distribution Charges	16	11	6			
				446	0	9
iting and distributing Notices of Meetings and other annual printing				25	12	9
ellaneous printing, &c., not annual—						
reasurer's Notices, &c.				3	0	0
enses at Meetings—						
Operator of Lantern	2	2	0			
Porter	1	0	0			
Tea	4	1	6			
				7	3	6
todian Trustee's charges				0	14	1
e and storage of stock of Publications—						
. Care of stock in London; J. Mugford	1	1	0			
. Storage of stock in Oxford (six months)	0	10	0			
				1	11	0
tor's Honorarium				50	0	0
tionery and Office Equipment—						
. Deed Box for Archives	4	17	4			
. Register of Members; loose-leaf binder and specially ruled sheets (1946–1970)	10	2	6			
. Stationery	0	16	0			
				15	15	10
tage—						
. Hon. Secretary	1	5	9			
. Editor (not charged)	0	0	0			
. Hon. Treasurer	4	8	0			
				5	13	9
eign Exchange; Control charges and losses on exchange				1	14	3
nation towards cost of X-ray Jubilee Meeting				3	3	0
r Emergency Expenditure—						
Transport; return of Archives and stock of the Mineralogical Magazine from Oxford to London				5	4	0
all items including Bank Charges				0	17	8
estments—						
Purchase of £5. 5*s.* 0*d.* 3% Defence Bonds				5	5	0
lances, December 31, 1945—						
. At Bankers on Current Account	130	6	9			
. In Post Office Savings Bank	507	8	0			
. In Office	10	1	3			
				647	16	0
				£1219	11	7

ined and compared with Vouchers and found correct.

F. A. Bannister
S. E. Hollingworth } Auditors.

A. J. Bull, Hon. Treasurer.

ry 17, 1946.

MIERS MEMORIAL FUND, YEA

Receipts	£	s.
By Balances brought in from 1944—		
At Bankers on Current Account	28	0
Donations received during year	38	9
Interest on Investments, including Income Tax recovered	11	7
	£77	16

COMPOSITION FEES (INVESTMENT) ACCOUNT

Receipts	£	s.
By Composition Fees received during the year	99	15
	£99	15

Note:—The total sum received as Composition Fees and invested was on December 31, 1945 . . . . . £1354 10

BALANCE

DECEMBER

Liabilities	£	s.	d.	£	s.
To *General Funds*:—					
Annual Subscriptions received in advance—					
1. Received in 1944 for 1946	1	1	0		
2. Received in 1944 for 1947	1	1	0		
3. Received in 1945 for 1946	11	13	9		
4. Received in 1945 for 1947	1	1	0		
				14	16
Sundry Creditors—					
1. Oxford University Press (Printers) For Authors' Separate Copies from No. 191 of the Mineralogical Magazine	4	4	0		
2. Expenses of the Petrological Microscope Committee	6	0	0		
				10	4
Special Funds:—					
Miers Memorial Fund				452	17
Excess of Assets over Liabilities				3363	1
				£3840	19

NG DECEMBER 31, 1945

Payments	£	s.	d.
stments: Purchase of £60 3% Defence Bonds	60	0	0
ce, December 31, 1945—			
Bankers on Current Account	17	16	7
	£77	16	7

ed and compared with Vouchers and found correct.

F. A. BANNISTER } Auditors.
S. E. HOLLINGWORTH }

/ 17, 1946. A. J. BULL, Hon. Treasurer.

ENDING DECEMBER 31, 1945

Payments	£	s.	d.
stments; purchase of £99. 15*s.* 0*d.* 3% Defence Bonds	99	15	0
	£99	15	0

ed and compared with Vouchers and found correct.

F. A. BANNISTER } Auditors.
S. E. HOLLINGWORTH }

/ 17, 1946. A. J. BULL, Hon. Treasurer.

ET

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Assets	£	s.	d.	£	s.	d.
eral Funds:—						
restments at Broker's Valuation—						
£1685 3½% War Loan, 1952 and after, at 103¾%	1748	3	9			
£105 4% Consolidated Loan, 1957, at 109¼%	114	14	3			
£100 4% Funding Loan, 1960–70, at 113¼%	113	5	0			
£146. 10*s.* 0*d.* 3% War Loan, 1955–59, at 102¾%	150	10	6			
£26 3% Conversion Loan, 1948–53, at 102½%	26	13	0			
£205 3% Defence Bonds at par	205	0	0			
£250 3% Savings Bonds, 1960–70 at 102%	255	0	0			
				2613	6	6
ry Debtors—						
Oxford University Press (Publishers)						
(*a*) For sales of publications, April 1–December 31, 1945	108	6	3			
(*b*) For Advertisement Fees, April 1–December 31, 1945	6	7	8			
Interest due 1/8/45 on £15 3% Defence Bonds, acquired May 1945		1	10			
Refund of Consular Fee on set of the Mineralogical Magazine sent to the U.S.A.		12	6			
				115	8	3
ance Fees in Arrear				1	1	0
ial Subscriptions in Arrear (£74. 10*s.* 8*d.* including £45. 11*s.* 7*d.* due from ex-enemy countries) estimated to realize				10	10	0
ices—						
At Bankers on Current Account	130	6	9			
In Post Office Savings Bank	507	8	0			
In Office	10	1	3			
				647	16	0
al Funds:—						
ers Memorial Fund—						
Investments at Broker's valuation—						
£435 3% Defence Bonds at par				435	0	0
ndry Debtors—						
Interest due 1/8/45 on £10 3% Defence Bonds, acquired May 1945					1	3
lance—						
At Bankers on Current Account				17	16	7
				£3840	19	7

:—The value of the periodicals retained after the disposal of the Library, that of the stock of Publications and that of the Society's other effects are not included in the Assets.

ary 17, 1946. A. J. BULL, Hon. Treasurer.

2. A contribution to the study of luxullianite: by Mr. M. K. Wells.

3. An X-ray examination of decomposition products of chrysotile (asbes and serpentine; by Dr. A. Hargreaves and Dr. W. H. Taylor.

4. Note on variations in the structure of zircon: by Dr. V. H. Stott Mr. A. Heller.

5. Barium-felspars from Broken Hill, New South Wales: by Mr. E. R. Se (taken as read) (vol. 27, p. 166).

THE MINERALOGICAL MAGAZINE

AND

JOURNAL OF

THE MINERALOGICAL SOCIETY

. 192 March, 1946 Vol. XXVII

An account of the Struy lead mines, Inverness-shire, and of wulfenite, harmotome, and other minerals which occur there.

By Sir Arthur Russell, Bart.

[Read November 2, 1944.]

HE Struy lead mines (Six-inch Ordnance Survey, Inverness-shire, sheet 17) . are situated on the west side of Strath Glass, about two miles south-west of uy village, and comprise three distinct sets of small long-abandoned workings,) of them being in the nature of trials only. All three workings are shown on six-inch map, and are on veins traversing the Moine schists. The Geological :vey Memoir of the district says that four veins may be traced on the hill face ween the Dùn south of Struy school and Crelevan; if this is correct there are) outcrops I have not seen. The mines are on what was until a few years ago t of Lord Lovat's estate. The date of their discovery is not known, but they :e apparently worked about the year 1818 by Thomas Alexander Fraser (afterrds 12th Lord Lovat) at the same time as his graphite mine in Strath Farrar; st of the work seems, however, to have been done by him between 1838 and 5, when miners were brought from England and housed in cottages specially lt for them in Struy village. In 1864 the Loch na Mèine workings were cleared l prospected, but since then no further work has been done. The earliest erence to the mines which I have been able to find is contained in G. and P. derson's 'Guide to the Highlands and Islands of Scotland' (London, 1834, 229, 539–540) in which it is stated that 'they were then abandoned, having n worked by Mr. Fraser of Lovat who found them unprofitable owing to their all size, and the extreem hardness of the gneiss rock'; and again 'Near Little uy, a lead mine, situate in a thick vein of heavy spar, traversing gneiss, was ie years ago opened by Mr. Fraser of Lovat, but it has been abandoned owing ts unproductiveness'. There is also a brief account of the mines in the Geocal Survey Memoir of the district,[1] and a reproduction of this with a few addiial notes appears in the Special Reports on the Mineral Resources of Great tain.[2] It is probable that some further information could be obtained by a rch through the documents in Lord Lovat's estate office at Beauly from which,

[1] Mem. Geol. Surv. Scotland, The Geology of the country round Beauly and Inverness, , pp. 98–99.

[2] The lead, zinc, copper and nickel ores of Scotland, 1921, pp. 108–109.

through the courtesy of Major Dewar, I have obtained a poor transverse and longitudinal section of the Loch na Mèine workings, undated but subsequent to 1864, and also some assay results. The following particulars of the workings and of the minerals found there are the result of careful examinations which I made in the summers of 1935 and 1936.

Loch na Mèine.—This, the most important of the three workings, lies at an elevation of about 1100 feet above sea-level, 430 yards north of the west end of Loch na Mèine, on the high ground about midway between Strath Glass and Strath Farrar, and is reached by a rough track leading up from Struy. Here is to be seen a hush running west down the hill, the site of two filled-in shafts which are connected by a shallow adit-level, and the remains of a water-wheel for pumping, water to work which was brought by a leat from Loch na Mèine (Loch na Mèine is in part if not wholly artificial as its eastern end is formed by a dam); also reservoirs, a dressing floor on which there still remains some broken ore, and a curiously designed and apparently unfinished smelter chimney, wrongly described in the Geological Survey Memoir as the ruins of an engine house.

Of the three this was the only mine which seems to have produced any marketable ore, but from the small size of the dumps, corroborated by the section, very little actual stoping appears to have been done. The engine shaft was sunk to a depth of about 18 fathoms, the other or older shaft on the incline of the vein to 14 fathoms. Besides the adit, a level from the engine shaft communicates with the bottom of the older shaft, and from the engine shaft another level at a depth of 11 fathoms has been driven east a few fathoms. There are two chutes of ore shown on the section, the principal in the older shaft, and another at adit-level in the engine shaft. The total length of the workings is only 20 fathoms. The vein here cannot actually be seen, but has an approximately east and west direction with a dip to the south of about 33° from the vertical. The vein-filling consists largely of pink and white baryte and quartz with embedded masses and coarse cleavage cubes of galena, and small quantities of black blende, also included masses of quartz-muscovite-granulite. The galena is said from assays to have yielded from 7 ounces to 22 ounces 11 pennyweights of silver to the ton of ore.

Allt Tigh Cumhaig burn.—This working is situated on the northern loop of the Allt Tigh Cumhaig burn, about 350 yards up from the Struy to Cannick road, $1\frac{3}{4}$ miles south of Struy village. The vein here traverses muscovite-biotite-schist and is intimately connected with, and partly incorporates, two pegmatite veins. It is well exposed both in the bed and sides of the burn, the course of which it follows for some distance. The vein has a direction about 30° north of west (magnetic) and is nearly vertical, varying in width from 1 foot at the north-east end of the exposure to 12 feet at the south-west end, where a level, now partially choked at the mouth, has been driven on it from the bed of the burn. In the Geological Survey Memoir it is assumed, on apparently slender grounds, that this vein is identical with that of Loch na Mèine. The vein-filling consists of pink baryte, with nests of crystallized quartz, many strings of black blende, smaller quantities of galena, a very little pyrite, strings of calcite, and numerous fragments of grey silicified schist, giving it in part a brecciated character. Fig. 1 is a photograph of a specimen showing one of the minor veinlets enclosed in muscovite-biotite-schist; here the succession from both walls is calcite, blende, baryte. The vein is an interesting one, and in addition to the minerals mentioned,

ntains small crystals of harmotome. Many interesting specimens of the vein-
ıff and of the minerals contained therein may be obtained from loose material
rived from the old level, and which has been carried down the burn to its lower
d near the road.

The first burn north of Allt Tigh Cumhaig.—Here, about 470 yards up from
e Struy to Cannick road, a trial level has been driven from the bed of the burn.
ıe vein, which follows the course of the burn for a short distance, traverses

Fig. 1. Veinlet, with margins of calcite, intermediate zones of black blende, and centre of baryte, in schist from Struy lead mines, Inverness-shire. $\times \frac{1}{2}$.

uscovite-biotite-schist and is accompanied on its south side by a pegmatite
in consisting of pink felspar, silvery mica, and quartz. It has a direction a
tle south of east, dips south at a steep angle, and is $2\frac{1}{2}$ feet wide where exposed.
ıe vein-filling is in part brecciated and consists of strings of pink and white
ryte and white calcite, with a very little black blende and galena and many
cluded fragments of greenish silicified micaceous grit. The level, which is still
en, has been driven for some little distance; the dump, however, though still
sh, contains little or no ore and the vein was obviously very poor. The only
her minerals observed were traces of chalcopyrite and marcasite.

Blende.

Blende occurs abundantly at the level on Allt Tigh Cumhaig burn. It forms
ownish-black strings and veinlets in pink lamellar baryte particularly in the
rtion of the vein enclosed in pegmatite where it is often in direct contact with

the coarse pink felspar. Occasionally it forms small 5 mm. black (111) twinne crystals showing repeated re-entrant angles and associated with crystals of calcit baryte, and harmotome. Black blende also occurs in much smaller quantity the Loch na Mèine working and at the level on the first burn north of Allt T Cumhaig.

Calcite.

At the level on Allt Tigh Cumhaig burn on the surface of the black crystalli blende there are sprinkled numerous small, up to 5 mm., beautiful water-cle symmetrical stout hexagonal prisms (10$\bar{1}$0), (0001) of calcite which often supp crystals of harmotome. From the level on the first burn north of Allt T Cumhaig a specimen was obtained showing a cavity in platy baryte, lined w crystals of calcite (1½ cm.) and baryte, the calcite crystals showing the sim but unusual combination of the hexagonal prism (11$\bar{2}$0) with the scalenohed (21$\bar{3}$1) and basal plane (0001) (fig. 2).

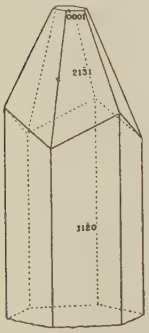


Fig. 2. Calcite.

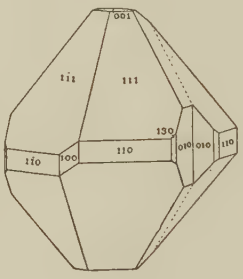


Fig. 3. Cerussite.

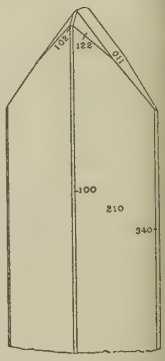


Fig. 4. Anglesite.

Crystals from Struy lead mines, Inverness-shire.

Cerussite.

Cerussite occurs in small patches throughout the galena-baryte vein-stuff at th Loch na Mèine working. It also forms small, up to 5 mm., colourless crystals varied habit in pyromorphite-lined cavities. These crystals are prismatic in t direction of the *c*-axis and either simple or twinned on *m* (110); they show t forms[1] *b* (010), *c* (001), *m* (110), *x* (012), *k* (011), *i* (021), *p* (111); others a pyramidal in habit and twinned on *m* (110) (fig. 3).

Anglesite.

A single specimen only was found at the Loch na Mèine working. It sho minute, up to 2 mm., colourless to greyish bladed crystals occupying a cavity galena and baryte, with a little quartz, cerussite, and a coating of pyromorphi on which are minute crystals of wulfenite. The anglesite crystals, two of whi were measured, are elongated in the direction of the *c*-axis and show the form

[1] Axial ratios and letters for this and the other minerals here described as in Dana's Syste of mineralogy, 6th edition, 1892.

(100), λ (210), h (340), o (011), and y (122). The faces (100), (210), and (340) are eeply fluted vertically from repetition (fig. 4).

Pyromorphite.

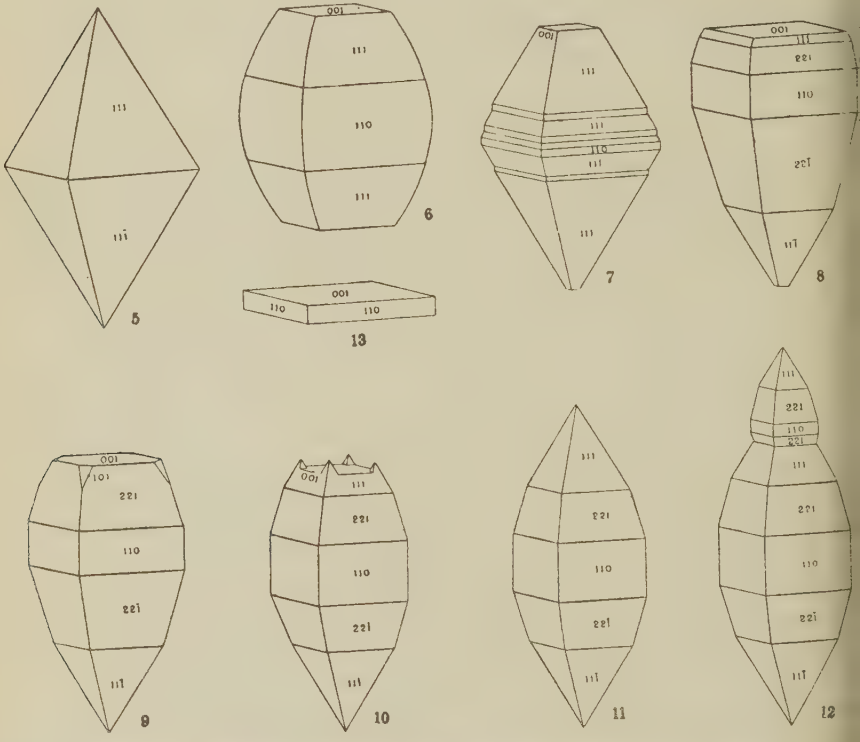
Pyromorphite is abundant on the galena-baryte-quartz vein-stuff at the Loch a Mèine working. It forms crusts of minute grass-green stout hexagonal prisms, lso siskin-green slender tapering prisms investing pyramidal crystals of quartz, nd more rarely minute golden-yellow transparent prisms associated with cerus- te and wulfenite.

Wulfenite.

Wulfenite occurs at the Loch na Mèine working as very small, not exceeding mm., crystals, which, minute as they are, appear both beautiful and interesting hen viewed under the microscope. Their colour is orange-red, rarely golden- ellow with blotches of red; and their habit, except in the case of one crystal, is ute pyramidal, which is distinctly rare for this species and has not previously en observed at the four other British localities, where the crystals are always ıbular in habit. The crystals either project from, or lie flat on, thin crusts of inutely crystallized green pyromorphite, which invests baryte, small bipyra- ıidal crystals of quartz, or hacked quartz from which baryte has been leached. n other specimens single crystals of wulfenite project from cavities in massive aryte lined with ochre. Sometimes as many as 25 minute crystals are present n a square inch of the pyromorphite-covered surface. The wulfenite appears to ave been the last mineral formed. In a few cases wulfenite crystals are penetrated y and have grown round prisms of pyromorphite. The crystals are sharp and ell defined and consist of the acute pyramid (111) either alone (fig. 5), or usually ı combination with (221), the prism (110), and base (001) (figs. 6–12). The faces 11) are slightly curved except at the apex and merge by repetition into those (221)and (110), giving the whole crystal a curved outline, some in fact being most barrel-shaped (fig. 6). The apparent hemihedral development is shown in ıe crystals figs. 7–10, fig. 9 being one of the few crystals on which the form (101) as been noted. Fig. 10 shows a curious castellated termination. The basal ane (001) is never smooth, the surface being either square-pitted or studded ith innumerable extremely minute (111) pyramids. The faces of (110) are orizontally striated from repetition with the adjoining pyramids, while on most the crystals the surfaces of (110), (221), and (111) are covered with raised and verlapping outlines of acute pyramids giving them a scaly appearance. In fig. 12 e have a compound crystal with a well-defined waist. In some crystals two arallel pyramids (111) terminate a single prism (110). Fig. 13 represents the ıly tabular crystal that has been observed; it is orange-yellow in colour. The easurements obtained from each of the faces are poor; but good enough to entify the forms with certainty. Micro-chemical tests were made for molyb- enum and lead, and an X-ray photograph kindly taken by Mr. F. A. Bannister nfirms the identity of the mineral.

All the specimens were obtained from masses of ore lying in the old ore bin, or digging into the heather and peat round one of the shafts. It was hoped that ı extended search might yield larger crystals, but although about 50 specimens ere found showing the mineral, none of the crystals exceed 2 mm. At the only her known Scottish locality for wulfenite, the Lauchentyre mine, Gatehouse of

Fleet, Kirkcudbrightshire, the mineral is extremely rare and occurs as minut orange-yellow tabular crystals on yellow pyromorphite investing quartz. Th Loch na Mèine wulfenite resembles in habit a crystal figured by A. Lacroix, fro Sidi Rouman mine, Constantine, Algeria.[1]



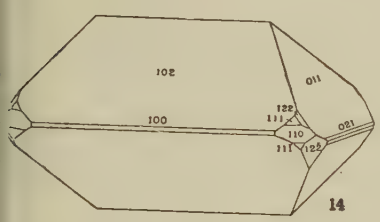
Figs. 5–13. Crystals of wulfenite from Struy lead mines, Inverness-shire.

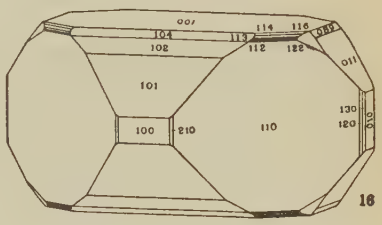
Baryte.

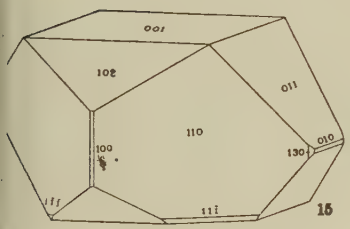
Baryte is the most abundant mineral in each of the veins, particularly so at the Loch na Mèine working; it does not, however, appear to be present in sufficient quantity to hold out any hope of being commercially workable. It is usually pink in colour, though sometimes white, and coarsely lamellar. At each of the workings it occurs as small colourless transparent crystals not exceeding 8 mm. in length which are interesting owing to their perfection, habit, and richness in forms, 1 of which have been observed on the crystals measured. Fig. 14 represents a typical crystal from the Loch na Mèine working. This is elongated in the direction of the *b*-axis and shows the forms (100), (110), (102), (011), the two latter largely developed, (021), (111), (122), also narrow faces of (166) between (011) and (122) not shown on the drawing. Figs. 15–17 represent crystals from the level on the first burn north of Allt Tigh Cumhaig. They are often very symmetrical com-

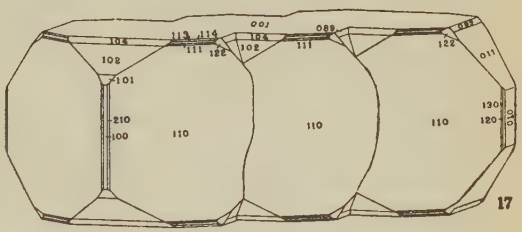
[1] A. Lacroix, Minéralogie de la France et de ses Colonies. 1910, vol. 4, p. 273, fig. 7.

ound crystals in parallel position as in fig. 17, and are themselves grouped in arallel strings of many compound individuals with re-entrant angles. All of he faces are bright and smooth and afford excellent reflections; those of (110) re invariably striated parallel to (001). The forms present are (100), (010), (001), 210), (110), (120), (130), (104), (102), (101), (089), (011), (115), (114), (113), (112), 111), (122), (166). Crystals similar to figs. 16 and 17, and showing most of the same orms, also occur with harmotome and blende at the level on Allt Tigh Cumhaig urn.







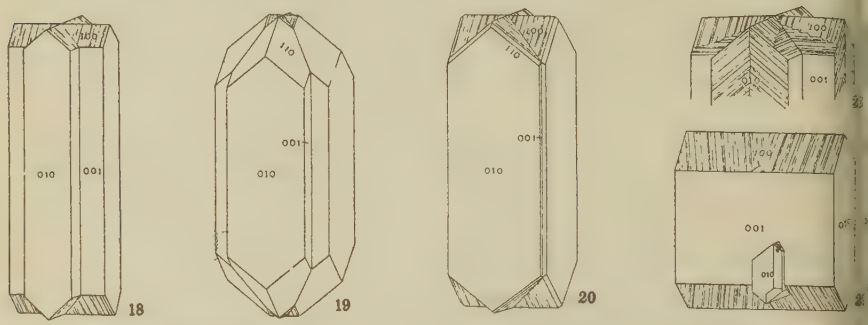


Figs. 14–17. Crystals of baryte from Struy lead mines, Inverness-shire.

Harmotome.

Harmotome occurs, though not very plentifully, on the vein-stuff at the level n the Allt Tigh Cumhaig burn. The crystals are small, up to 5 mm., but are ery beautiful, exhibiting various modifications of the characteristic complex ruciform twins. They are colourless and often doubly terminated, the appearance f the terminations varying much, depending on the relative development of (100) r (110); likewise the re-entrant angle of (001) may be very prominent or insignicantly developed. Figs. 18–22 show typical examples drawn from actual neasured crystals, all of which types may occur on the same specimen. The (100) aces are striated parallel to their intersections with (010); their terminal edges re, however, often slightly inclined away from the centre of the cross, and when his is the case the faces are seen to be fluted in two directions, the upper portion arallel to the intersection with (010), the lower parallel with (001), a step-like nedial line forming the boundary between the two and suggesting oscillation etween (100) and (001) in the lower half (fig. 21). On (010) the medial line is enerally very distinct and slightly raised; the characteristic herring-bone striae, hough often distinct, are by no means always visible. Optical examination of his face shows how very complex the crystals are, the sectors overlapping in a ost irregular manner with erratic lines of junction. Associated with the cruciform

twins there are smaller 1½ mm. water-clear crystals, combinations of (001) (100), and (010) (fig. 22) which shows two small individuals in twin position wi the larger. On these crystals the striae on (100) are considerably out of paral with the intersection with (010).



FIGS. 18–22. Crystals of harmotome from Struy lead mines, Inverness-shire.

The harmotome crystals are emplanted on crystals of blende, on baryte o calcite, and sometimes directly on the pink felspathic rock itself. Sprinkled o them and also included in them are minute crystals of pyrite and marcasit Harmotome, a mineral formed during the very last phases of hydrothermal actio occurs here as elsewhere in veins containing baryte which have an igneous rock for one or both walls, in this case one wall being a pegmatite. The mineral exhibits a remarkable resistance to weathering; hence the freshness of the crystals, despite having lain so long on the dumps.

Baryte and fluorite from Loch Bruicheach, Beauly, Inverness-shire.

By Sir Arthur Russell, Bart.

[Read November 2, 1944.]

OCH Bruicheach (One-inch Ordnance Survey of Scotland, popular edition, sheet 37; Six-inch Inverness-shire, sheet 18) is situated 7½ miles (about 9 es by road) south-west of Beauly and is best reached by taking the road from t town to the keeper's house at Clunevackie and thence by a track to within ut half a mile of the actual locality, a low cliff bordering the north-east shore he loch. Attention was apparently first directed to the locality about the year 4 by a Mr. John Ross, one of Lord Lovat's gamekeepers, and Mr. Thomas D. llace of Inverness, having received through him specimens from there of yte and a mineral which he, Mr. Wallace, recognized as resembling fluorite, ted the spot with Mr. Ross in May 1885. In August of the same year Mr. Wallace e a description of the occurrence in the pages of this Magazine,[1] and in July 6, also in this Magazine, there appeared a note and analysis of the fluorite by fessor W. Ivison Macadam of Edinburgh, who in collaboration with Mr. Wallace posed for the mineral, without any sort of justification, the name bruiachite.[2] cadam's analysis of the fluorite was very inaccurate and showed only 10 % of rine. In 1889 Professor M. Forster Heddle, at the instigation of Dr. T. Aitken nverness, made a satisfactory analysis and determined the optical characters he so-called bruiachite, a second analysis being made by Mr. J. Stuart Thomson, l the results were embodied in a paper in which it was shown that the mineral a perfectly normal fluorite.[3]

The following notes are based on specimens of baryte and fluorite which I ected at Loch Bruicheach in the summer of 1935. On the north-east shore of loch a low sloping cliff formed of coarse conglomerate belonging to the base- nt bed of the Old Red Sandstone resting on schists of the Moine series, is versed by a nearly vertical vein of baryte carrying small strings of fluorite. s vein has a north-east direction and a width of from one to two feet and is posed for a few yards only on the sloping cliff face. Mr. Wallace claimed, vever, to have traced it 'into the loch for a distance of twelve or fourteen yards'. The baryte is pink in colour and fills the entire vein with compact banded newhat radiating concentric layers, between which, in places, are comb-like ers of white to colourless highly crystalline fluorite 2 cm. to a mere thread thickness. The thicker layers of fluorite are invariably divided by a medial sometimes amounting to an open crack, and curiously enough this often ually divides the individual crystal segments forming the comb, suggesting

T. Wallace, Notes on northern minerals. Min. Mag., 1885, vol. 6, pp. 168–169.

W. I. Macadam, On the chemical composition of the mineral bruiachite, found by Thomas D. Wallace, of Inverness, at Loch Bhruithaich, Inverness-shire. Min. Mag., 1886, 7, p. 42.

M. F. Heddle, On the identity of bruiachite and fluor. Min. Mag., 1889, vol. 8, pp. 274–277.

that the crack was formed subsequently to the filling. On free surfaces the bar has a tendency to form cock's-comb aggregates of crystals. One narrow cavity the vein was found to be lined with a crust of small but very beautiful cry of baryte. These crystals are colourless and extremely brilliant, though 'en mas they appear somewhat yellowish from an underlying rusty coating on the mass baryte and fluorite. They attain a length of 5 mm., are doubly terminated, and in parallel position with in some cases a concentric arrangement and the fa faces of (102) usually uppermost. They are elongated in the direction of the *b*-a and show the forms[1] *a* (100), *b* (010), *c* (001), *m* (110), *d* (102), *κ* (130), *o* (0 *r* (112), *g* (113), *z* (111). The face (102) is always very prominent, the other fa varying much in development. Figs. 1 and 2 represent two typical meas ur crystals drawn with (010) in front in order to better show the development.

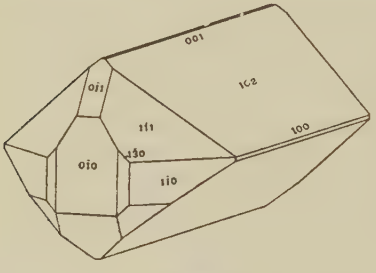


Fig. 1.

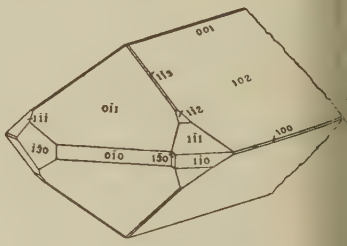


Fig. 2.

Figs. 1 and 2. Crystals of baryte from Loch Bruicheach, Inverness-shire.

In addition to the colourless fluorite, this mineral rarely forms bluish-lavend crystalline layers up to 5 mm. in thickness between compact pink and bu coloured sandy baryte. More rarely still the layers of colourless fluorite conta little cavities lined with small yellowish or white cubes up to $2\frac{1}{2}$ mm. along t edge, with crystals of baryte. No trace of any metallic mineral was observed the vein.

[1] Axes of reference ($a : b : c = 0{\cdot}8152 : 1 : 1{\cdot}3136$) and letters as in Dana's System mineralogy, 6th edit., 1892, and V. Goldschmidt, Atlas der Krystallformen, 1913, vol. 1.

npsonite and other tantalates from Bikita, Southern Rhodesia.

By A. M. Macgregor, M.A., F.G.S.
Geological Survey of Southern Rhodesia.

[Read November 1, 1945.]

HE Bikita tin and tantalum field is centred about 43 miles east-north-east of Fort Victoria, in the south-eastern part of Southern Rhodesia. It forms end of a tongue of basic and sedimentary schists surrounded on three sides by ite. Tin and tantalum minerals have been known in the area for over thirty rs, and at various times attempts to work them have been made, but with fferent success. During recent years the demand for tantalum has led to the pening of the field and several tons of tantalite and simpsonite concentrates e been exported to America. The area was mapped geologically by Mr. R. dale-Biscoe in 1942, but the publication of the map and report have been t up during the war. The principal workings are the Mdara mine and the Hayat claims situated about three-quarters of a mile apart.

he Mdara mine has been worked as open quarries in a small hill composed of ngle of dikes and lenses of partly greisenized pegmatite and felspar-rock which n an oval area in epidiorite country. The hill is surmounted by a mass of ple lepidolite. Later dolerite has been intruded as sills through and beneath hill. Crystals of tantalite occur sporadically in knots or bunches in felspar-, generally in association with lenses of quartz. The concentration through- the whole hill has been proved to be sub-economic at present prices. The overy of simpsonite in a more consistent body has somewhat improved the king conditions. The Al Hayat claims contain small scattered workings for talite in pegmatite dikes with quartz lenses. One dike contained a small mass reisen with rather abundant microlite.

he exploitation of the area has thrown a great deal of work on Mr. Ernest ding, Chemist to the Southern Rhodesia Geological Survey, who has made ays for tantalum and columbium, tin, titanium, zirconium, &c., of samples n every consignment of concentrates which has been dispatched. In general e is little of scientific interest in the results of these assays, except that they w that the proportion of columbium to tantalum varies considerably. At the ra mine the ratio of Ta_2O_5 to Cb_2O_5 varies in different consignments from : 1 to 8·3 : 1, with an average of about 5·3 : 1. At the Al Hayat claims the portion of Ta_2O_5 has generally been lower.

n the course of his work in 1940 Golding observed an unfamiliar brown slucent mineral in one of the samples from the Al Hayat claims. He collected icient of the mineral for a full analysis and retained a few specimens for record. composition corresponded to that of a manganotantalite very low in iron. specimens were not examined physically until recently, when it was found t they show optical characters suggesting monoclinic symmetry. This mineral present under further investigation, and it is hoped to publish a full descrip- later.

In May 1943 simpsonite was found by Golding in a sample from the Md mine, which included ore from a new prospecting shaft then being sunk. Analy proved the mineral to be essentially a tantalate of aluminium. For a time th was a doubt whether it conformed with the original simpsonite from West Australia, but these doubts have been removed by Dr. W. T. Schaller of t United States Geological Survey, who has very kindly put his information at t service.

To determine the refractive indices of the minerals, a series of liquids v intervals of 0·01, ranging from 1·90 to 2·06 were made according to C. D. W method.[1] The refractive index of the 1·90 liquid was determined on the Le Jelly refractometer, and the liquid 2·00 and 2·05 were verified by comparison wi ω of cassiterite and pyromorphite respectively. In computing formulae f chemical analyses the atomic weights of tantalum and columbium used a 180·88 and 92·92 respectively.

Chemical analyses of simpsonite, manganese tantalate, and microlite.

	A.	B.	C.	D.	E.	F.	G.
Ta_2O_5 ...	60·01	69·46	66·20	72·31	71·48	71·10	74·3
Cb_2O_5 ...	6·05	1·84	1·80	0·33	0·32	5·04	4·7
SnO_2 ...	... 0·42	1·45	1·31	2·00	1·19	2·54	nil
SiO_2 ...	... 8·01	1·60	2·40	1·78	2·34	7·20	1·2
TiO_2 ...	trace	0·10	0·08	—	—	trace	nil
ZrO_2 ...	... 0·05	trace	trace	—	—	nil	nil
Al_2O_3 ...	22·58	23·79	23·52	16·75	18·64	1·05	0·5
Fe_2O_3 ...	... 0·11	—	0·88	0·14	0·48	trace	—
FeO ...	... 0·82	0·60	0·69	0·16	0·44	0·69	0·7
MnO ...	... 0·03	0·32	0·38	0·08	0·04	10·00	nil
PbO ...	... —	—	—	0·42	nil	—	—
BeO ...	... —	—	—	—	—	—	nil
MgO ...	trace	trace	trace	—	—	0·24	nil
CaO ...	... 0·32	0·41	1·40	3·40	3·19	1·34	11·6
Na_2O ...	... 0·39	0·35	0·46	1·16	0·68	0·48	5·1
K_2O ...	. . 0·23	0·13	0·44	0·24	0·42	0·20	0·4
H_2O+ ...	... 0·19	0·12	0·62	1·35	1·39	0·46	0·2
H_2O- ...	... 0·27	0·32	0·03	0·20	0·03	0·02	0·0
P_2O_5 ...	... 0·55	nil	nil	—	—	—	0·3
F	trace	trace	trace	0·21+	0·38+	—	0·5
Total ...	100·03	100·49	100·21	100·53	101·02	100·36	100·0
Sp. gr. ...	—	—	—	6·525	6·27	7·7	6·01

A. Simpsonite, Mdara mine, Bikita. E. Golding (GM. 654).
B. Fluorescent simpsonite, Mdara mine, Bikita. E. Golding (GM. 706).
C. Altered simpsonite, not fluorescent, Mdara mine, Bikita. E. Golding (GM. 709).
D. Simpsonite, Tabba Tabba, Western Australia. D. G. Murray (H. Bowley, 1939).
E. Simpsonite, Tabba Tabba, Western Australia. J. N. A. Grace (H. Bowley, 1939).
F. Brown manganese tantalate, Al Hayat claims, Bikita. E. Golding (GM. 488).
G. Microlite, Al Hayat claims, Bikita. E. Golding (GM. 508).

Tests for S, CO_2, WO_3, Th, and rare-earths gave negative results in Golding's analyses.

Simpsonite.

Simpsonite was discovered in a prospecting shaft sunk in a dike of felspath pegmatite a quarter of a mile north of the main Mdara workings. It appears

[1] C. D. West, Amer. Min., 1936, vol. 21, p. 245. [M.A. 6–460.]

imited to a band one to two feet thick, underlying a large lens-shaped mass of rtz. The gangue is felspar-rock composed mainly of plagioclase between te and oligoclase in composition. Close to the quartz this rock is sometimes citized and greisenized. Below the simpsonite band the felspar-rock with rse tantalite and some cassiterite continues for several feet, until it is cut by a k sill of dolerite. Narrow dikes of dolerite are also found cutting the simpsonite-ring rock close to the quartz body.

he mineral simpsonite was first discovered in 1934 at Tabba Tabba in Western tralia, and is described by H. Bowley and L. E. R. Taylor.[1] Miss Taylor's ay photographs indicate that the mineral belongs to the apatite (diplohedral) s of the hexagonal system. The chemical formula was deduced by Mr. Bowley, xing allowance for impurities, as $2H_2O.CaO.5Al_2O_3.4Ta_2O_5$ with a very little mbium replacing the tantalum. The mineral is described as very hard. cific gravity 6·525 and 6·27 (two specimens). Uniaxial, positive. Refractive ex 2·06, and birefringence 0·1.

'he Bikita mineral resembles simpsonite as described by Bowley in respect of colour, uniaxial character, hardness, high specific gravity, and general com-ition. Thin sections showing the alteration also resemble the photograph ured by Bowley. It differs in being optically negative, in having a lower bire-gence, and in the fact that it does not contain sufficient water or lime to satisfy wley's formula.

ome correspondence took place with the purchasers of the mineral in America, o were inclined to consider in view of these differences that a new name for the neral was required. Doubts were removed by the work of the United States logical Survey when in August, 1944, a letter was received from Dr. W. T. aller, who writes:

Recently I received from the Minor and Rare Metals Section of the Office of Economic rfare, samples of a mineral from Bikita, Rhodesia, together with a copy of your letter of gust 27, to Mr. Sharpstone, and a letter from the Fansteel Corporation stating their belief t the Bikita mineral was distinct from simpsonite. Simpsonite from Tabba Tabba (U.S. ional Museum 103440), the Bikita mineral, and two samples of "aluminum tantalate" n Brazil were found to be uniaxial negative, so that Bowley's statement seems to be rrect. X-ray powder patterns [reproduced here in fig. 1] of the four samples, made by J. M. Axelrod of this Laboratory, are identical, confirming your identification of the ita mineral as simpsonite, and giving two new Brazilian occurrences. I shall be interested eeing the description of the Bikita deposit which I understand you plan to publish. You free to use the information in this letter in any way you desire.'

The colour of the Bikita simpsonite is pale yellowish-buff varying somewhat ight brown. There is always a red or brown coating on the outer surface and en on the surfaces of cracks through the crystals. The lustre of the fresher ts is greasy. The mineral scratches quartz and some beryl easily, but is not as d as topaz. Three specimens were found to have specific gravity of 6·678, 3, and 6·84 respectively, but the value is often lower owing to alteration.

The mineral usually breaks with the matrix and no well-shaped crystals have n isolated. A tabular habit is sometimes distinguishable with a base perpen-ular to the optic axis. The largest crystal mass seen measures $5 \times 5 \times 4$ cm.

H. Bowley, Simpsonite (sp. nov.) from Tabba Tabba, Western Australia. Journ. Roy. Western Australia, 1939, vol. 25, pp, 89–92. L. E. R. Taylor, X-ray studies of simpsonite. ., pp. 93–97. [M.A. 7–369.]

It appears to be built of sub-parallel hexagonal prisms. Some crystals can clearly seen to have grown on felspar crystals. There is probably a poor py midal cleavage. This is suggested by the frequency of grains in the powde mineral which show the negative optic axis to emerge just outside the fiel view of the microscope. Thin sections show roughly parallel cracks in n directions.

The refractive indices were determined as ϵ 1·995± and ω 2·035±. The fringence determined by the examination of grains and thin sections appea have a maximum between 0·040 and 0·045. The unaltered mineral fluore rather strongly with a bluish-white colour in the light of a 'mineralight' la (wave-length 2540Å.). This shows very clearly the extent of the altera throughout the simpsonite crystals.

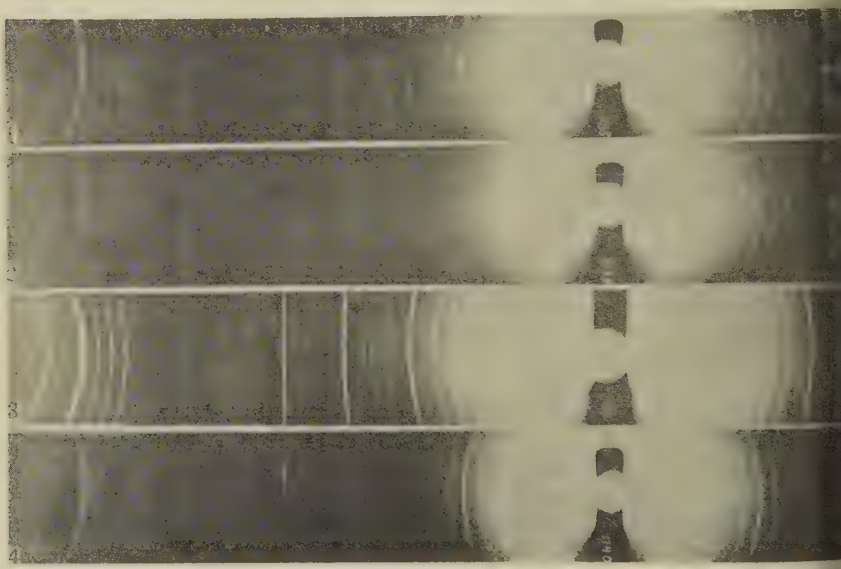


Fig. 1. X-ray powder photographs (Fe-radiation) made by United States Geological Surv Washington, proving the identity of simpsonite from four localities.

(1) Bikita, Southern Rhodesia. (2) Tabba Tabba, Western Australia. (U.S. Natio Museum, no. 103440.) (3) Brazil. (Ditto, no. 104738.) (4) Brazil. (Ditto, no. 104739.) (spacings compare Kerr and Holmes, loc. cit., 1945, p. 494, pl. 2.)

Alteration of Simpsonite.—All the simpsonite examined has undergone so alteration, which varies greatly in degree in different specimens and parts of t same crystal. The principal product is an unidentifiable mineral in the form minute colourless, apparently rhombic (110) prisms with approximately strai extinction and positive elongation. The birefringence (0·12±) is higher than t of simpsonite, and the indices of refraction are above 2·06. The axial angle large and positive. The alteration is accompanied by a fall of specific gravi The average specific gravity of several small altered specimens of dull appeara was determined as 6·49. In addition to this product there is a second mine

forms dusty clouds in the clearer parts of the simpsonite between the . This mineral may be microlite.

escribing the Tabba Tabba simpsonite Bowley writes:

er the microscope with reflected light it appears as colourless masses intergrown with ream alteration product. With transmitted light a section of a crystal showed irregular a transparent colourless anisotropic mineral bounded by interlacing veinlets of a nount of a colourless isotropic mineral, which is intergrown with a pale cream almost granular mineral without any crystal habit whatever.'

era-lucida drawings of altered Bikita simpsonite are given in figs. 2 and 3. e simpsonite forms the clear portions of the field, except the bottom part 2 which represents felspar partly altered to sericite. The stippled areas nt the cloudy alteration which may be microlite. The prisms of the tified alteration product appear to be generally parallel to the optic axis simpsonite in fig. 2. Cross-hatched areas represent aggregates of goethite.

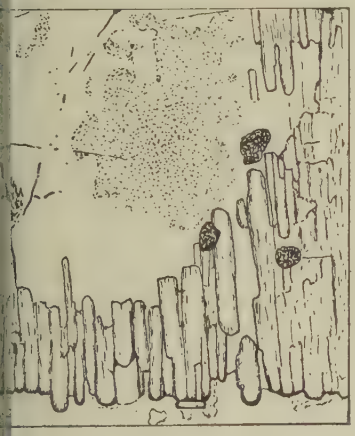


FIG. 2.

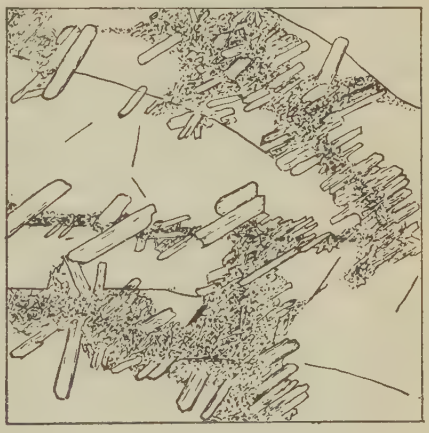


FIG. 3.

n of simpsonite. Clear areas unaltered material. Sides of squares represent 0·4 mm. Slide 10967.

ical Composition.—Three analyses by Golding of the Mdara simpsonite en in columns A, B, and C of the table. Analysis A was made in 1943 on l crystals from a concentrate. Since the composition found differs lly from Bowley's formula, it was considered advisable to have a second s made as confirmation. An attempt to grind away the outer, altered s of a large crystal to obtain a clean sample, proved unsatisfactory owing depth to which the alteration penetrates. Sample B, showing uniform ence, from coarsely crushed mineral was therefore preferred. This was in bromoform to remove quartz and felspar. The third analysis, C, was n altered simpsonite selected to include as little fluorescent material as , in the hope of elucidating the alteration product.

are of course many ways of interpreting the accessory constituents. But yses suggest that the formula for simpsonite is $4Al_2O_3.3Ta_2O_5$ (theoretically 3·58, Ta_2O_5 76·42%).

In A minor constituents can be allotted to probable minerals to fit the form exactly. In B there is a slight excess of alumina. This may be explained b slight underestimate of the Cb_2O_5 in the mixed oxides.

Bowley derived his formula, $2H_2O.CaO.5Al_2O_3.4Ta_2O_5$ from analyses D a E, which are reprinted from his paper, by assuming that microlite has an in able formula $CaNaTa_2O_6F$. In three additional partial analyses fluorine found to vary from 0·81 to 0·89. He limited the microlite in the altered s sonite to the available fluorine and allocated the remaining lime and water t simpsonite formula. To the writer it appears reasonable to assume that micr is an isomorphous mixture, that the lime-soda ratio may be variable, and fluorine may be replaced by hydroxyl. When all the lime and soda are taken as microlite with a formula $6CaO.3Ta_2O_5.CbOF_3$ and the potash as musco the molecular proportions of the remaining Ta_2O_5 and Al_2O_3 have the rat 0·757 and 0·728 to 1 in the two analyses respectively, in close agreement with formula here proposed.

The analysis of the altered simpsonite C, when compared with A and B, sh increased iron, lime, potash, silica, and combined water, and a lower conte of mixed oxides. It is otherwise very similar. Interpreting the silica as seri the lime and excess soda as microlite, and the iron and manganese as oxides $Al_2O_3 : Ta_2O_5$ ratio is very near 3 : 2. A mineral of this composition and spec gravity 6·5 has a calculated mean refractive index of 2·00 compared with 2 for simpsonite, which is anomalous in view of the observation that the alterat product has the higher refractive index.

Since this description was written, a detailed study of the Brazilian simpsoni has been published by Kerr and Holmes,[1] in which reference is made also to t Australian and Southern Rhodesian material. These authors point out t mistake in the original determination of the optical sign of the Australia simpsonite and also conclude that the ideal composition is that of an aluminiu tantalate. They publish analyses of the Brazilian material from which they co pute the formula $3Al_2O_3.2Ta_2O_5$, which is also the formula suggested by Guimarãe for 'calogerasite'. The seventh edition of Dana's 'System of mineralogy' (194 vol. 1, p. 771) gives a formula $Al_2O_3.Ta_2O_5$. Evidently the range of compositi in simpsonite is a matter for further study.

Abnormal Manganese Tantalate.

This mineral attracted attention owing to its high specific gravity and the lar tantalum content compared with that of other concentrates from the Al Hay claims. It was found in a vertical pipe-like body of fine-grained, dark purp greisen a few feet in diameter and less than twenty feet deep. The mica gives definite lithium, and a strong potassium flame coloration, and reacts strong for manganese. The optical characters of the mica are: optic axial plane paral to (010), which is generally longer than the other sides of the hexagonal plate

[1] P. F. Kerr and R. J. Holmes, X-ray study of the tantalum mineral simpsonite. Bu Geol. Soc. Amer., 1945, vol. 56, pp. 479–504. F. H. Pough, Simpsonite and the northe Brazilian pegmatite region. Ibid., pp. 505–514. [M.A. 9–186.]

[2] C. P. Guimarães, Calogerasita, um novo mineral da família dos tantalatos. Mineração Metalurgia, Rio de Janeiro, 1944, vol. 8, pp. 135–136. Anais Acad. Brasileira Ciencias, 194 vol. 16, pp. 255–260. [M.A. 9–127.]

75°, α 1·557±, β 1·585±, γ 1·590±. It is probably a manganiferous protolinite. Thin sections of the rock show the presence of a little quartz and some olite fringing the tantalate.

he greisen, which was evidently rich in tantalum, was mined, crushed, and concentrate shipped. During a recent visit a few additional specimens of the eral were found on the ground around the site. The larger specimens have the n of spheroidal aggregates of radiating needles. Terminal faces have not been tified. Smaller crystals 1 mm. or less in diameter have the form of flattened ramids with nearly square outlines, often with grooved edges suggesting synthetic twinning. The bipyramids themselves form interpenetrating twins, look like orthorhombic crystals.

he powdered mineral has a pale buff colour. Under the microscope the inctive features are yellowish-brown colour, with very slight pleochroism, slucence up to a thickness of about 0·4 mm., very high refractive indices and fringence. Some grains show a positive biaxial figure with small axial angle very strong horizontal dispersion. Owing to polysynthetic twinning, in ch the extinction-directions in each twin of a pair are parallel, the figure is erally seen only when the elasticity axes α and β are parallel with the cross-s. In other positions the figure is masked by light transmitted by the ining twin.

licroscope sections were cut as nearly as possible parallel and transverse to the ating crystal needles (slides 10972 and 10973). Longitudinal sections show ight extinction and frequently the acute bisectrix with axial plane parallel with the length of the fibres. In nsverse section the needles appear to be blade-shaped ns with the generalized form shown diagrammatically ig. 4. The acute bisectrix γ makes an angle of about in the acute angle with the twin composition-plane. sketch makes it clear why in twinned crystals the ic figure is seen only in positions of extinction. Owing nutual interference of the blades, the crystal form can determined only very roughly. There appears, how-, to be a tendency to bilateral symmetry about the position-plane as shown in the diagram. This is taken ndicate that the axis of twinning is perpendicular to plane, and also that the mineral probably belongs to holosymmetric class of the monoclinic system.

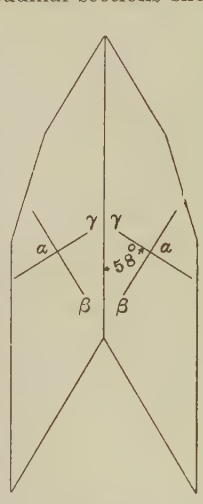


FIG. 4.

Generalized transverse section of twinned needle of manganese tantalate showing optical orientation.

rystals scratch the pyramidal faces of quartz. The ific gravities of eight specimens were determined by N. E. Barlow by immersion, and found to range from to 7·76. Neglecting the two lowest which were made material visibly impure, the average specific gravity of remaining six was 7·66.

he chemical composition is given in column F. The a, alumina, and alkalis are explained as quartz and a, and the tin as cassiterite. It will be seen by the following molecular ratios the remaining bases—lime, iron, and magnesia—balance the tantalum and mbium oxides very closely indeed to give the general formula $MnO.Ta_2O_5$:

Ta_2O_5	...	...	0·16095	0·17991
Cb_2O_5	...	...	0·01896	
MnO	...	...	0·14099	0·1804
CaO	...	...	0·02390	
FeO	...	...	0·00960	
MgO	...	...	0·00595	

The description of this unidentified mineral may be summarized as follow Composition, manganese tantalate, $MnTa_2O_6$, with some manganese replaced by lime, iron, and magnesia, and some tantalum by columbium. Occurs as radiating aggregates of blade-shaped needles. Twinning common and sometimes repeated. H. 7; sp. gr. 7·7. Fracture hackly or conchoidal; an indistinct cleavage is sometimes discernible. Lustre resinous to adamantine. Colour between snuff-brown and cinnamon-brown as defined in Ridgway's colour standards. Streak and powder tilleul-buff by the same standards. α, β, and γ are all above 2·06, probably between 2·10 and 2·40, $\gamma-\alpha$ nearly 0·2. Pleochroism weak, $\alpha<\beta<\gamma$, α and β pale brownish-yellow, γ green. Biaxial positive, 2E 75°, 2V about 34° assuming β about 2·12. Apparent strong horizontal dispersion, axial dispersion $r<v$.

In chemical composition and general physical properties this mineral resembles described manganotantalites. These, however, are orthorhombic, and artificial $MnTa_2O_6$ has also been shown[1] to be isomorphous with columbite. The horizontal dispersion observed in the Southern Rhodesian material suggests monoclinic symmetry, unless it is accounted for by overlapping of twin-lamellae. It is hoped that further examination will determine the symmetry unambiguously.

Microlite.

On Al Hayat claims microlite occurs rather abundantly in a small body of greisen composed of muscovite, quartz, and pale blue topaz. Rubellite and zircon are also present. The microlite has the form of steely-grey octahedra. Under the microscope it is seen to be colourless and perfectly isotropic, but to contain minute specks of black powder, perhaps magnetite, which may account for the metallic appearance in the hand-specimens. The refractive index is between 2·03 and 2·04, varying somewhat. The values usually given for microlite are about 1·93, but Larsen[2] states that the value rises to 2·04 on ignition. An analysis of the microlite obtained by repeated panning of a sample after rejecting the fines, and the coarse portion which contained most of the topaz and quartz, is given in column G. After deducting apatite, magnetite, muscovite, and orthoclase, the molecular proportions of the remaining radicals are as follows:

$(Ta,Cb)_2O_5$	...	...	0·18631	$= 2\times0·09315$
CaO	...	...	0·20120	$= 3\times0·09456$
Na_2O	...	...	0·08274	
F+OH	...	...	0·04912	$= \frac{1}{2}\times0·09836$

This conforms approximately with the formula quoted by Bowley, $CaNaTa_2O_6F$, except that there is only a quarter of the requisite fluorine and hydroxyl, and that some of the soda is replaced by lime.

Late in 1944 a new deposit of microlite which may prove to have an economic importance was discovered about three-quarters of a mile east of the Mdara mine.

[1] K. Brandt, Arkiv Kemi Min. Geol., 1943, vol. 17A, no. 15. [M.A. 9–100.]

[2] E. S. Larsen, The microscopic determination of nonopaque minerals. Bull. U.S. Geol. Surv., 1921, no. 679, p. 179.

e ore-body is an intrusive sheet inclined at about 30° in greenstone country. appears to be between 10 and 20 feet thick and is exposed continuously along ne of over 400 feet with indications of greater extension. The sheet is formed inly of albitite, but varies considerably owing probably to metasomatic nges. Much of the rock is fine-grained, and consists of plates of albite about nm. long and 0·3 mm. thick. A little white mica and apatite are present ounting together to less than 1%. No quartz could be recognized (slide 11040). associated rock is a lepidolite-albitite (slide 11041). The mica has crystallized h the albite and forms scales up to 3 mm. in diameter. The optic axial plane arallel to (010), and the angle 2E varies greatly from about 60° to 0°, often in same crystal. This rock contains about 20 to 30% of mica, but probably des into completely micaceous rock.

Microlite can be panned from the majority of the specimens, but it is most ndant in a coarse-grained rock composed largely of divergent leaf-like masses lbite (cleavelandite) in the form of curved plates about 1 mm. thick and several hes long (slide 11039). A little quartz is present in this rock; thin sections show it some of the albite contains it as a myrmekitic intergrowth. No potash-par is recognized (slide 11038). The albite plates are broken and traversed minute cracks in which secondary mica has been deposited. Microlite is ociated with this mica, and occurs as bunches of crystals often grouped round mall core of tantalite. It varies from yellow to colourless and is sometimes ied, being darkest at the margins. A grab sample of this rock collected along line of strike was concentrated by the Government Metallurgist and found to tain about 0·05–0·07% of microlite and tantalite.

In conclusion I wish to express my gratitude to the Geological Survey of the ited States of America and to Dr. W. T. Schaller for allowing me to publish results of their work, and my appreciation to Mr. Ernest Golding for his instaking analytical work, without which these notes would have little value.

Barium-felspars from Broken Hill, New South Wales.

(With Plate XIV.)

By E. R. Segnit, B.Sc.

Department of Geology, University of Adelaide.

[Read November 1, 1945; communicated by Sir Douglas Mawson, F.R.S.]

At two localities on the outskirts of the township of Broken Hill—near the De Bavay shear zone, and at 'The Piggery'—W. R. Browne[1] reported unusual rock types rich in barium. His statement is accompanied by an analysis by H. P. White (analyst to the Mines Dept.) of one of these rocks, which contains 9·23% BaO. Subsequently S. R. Nockolds and E. G. Zies[2] examined the felspars of the rock analysed by White with a view to ascertaining whether they are barium-containing varieties.

In view of the very high barium content of some of the occurrences now being investigated, much higher than that of the rock examined by Nockolds and Zies, a further mineralogical investigation was undertaken with the results recorded below. The rocks under examination were light-coloured gneisses containing up to 15% BaO. They are distributed as lenses and streaks in an acid gneiss. A specimen of the latter rock was analysed and found to contain only 0·09% BaO. The barium was found to occur in four felspars, one being a new variety of celsian. The minerals studied were celsian, calciocelsian, hyalophane, and barium plagioclase. A careful search was made for other barium silicate minerals such as sanbornite, but none was found.

Celsian.

This mineral was found in two specimens only, both collected from within a few inches of one another. They are light grey in colour and do not differ appreciably in appearance from the other barium-gneisses of the locality. In thin section the rock is seen to have an equigranular structure with grain-size of the order of 0·2 mm. Felspar is the chief mineral constituent. It makes up 85–90% of the rock, the other 10–15% being chiefly quartz and hornblende. The last is concentrated along gneissic bands in the rock; it is a green variety, strongly pleochroic: α pale greenish-yellow, β dark green, γ blue-green. Accessory minerals are plentiful, and include epidote, sphene, garnet, apatite, zircon, orthite, chlorite, biotite and muscovite.

Two felspars are present—celsian and plagioclase; both are quite fresh, and practically indistinguishable under ordinary microscopic examination. The plagioclase is only rarely twinned, twin-laws observed being albite and pericline. The optic axial angle (2V) measured on the universal stage is 82°, with negative sign, and this, together with the high extinction-angle of the albite twins, indicates a composition of $An_{82}Ab_{18}$. This agrees with the specific gravity, 2·74, found

[1] W. R. Browne, Mem. Geol. Surv. N.S.W., 1922, no. 8, appendix 1, p. 337.

[2] S. R. Nockolds and E. G. Zies, Min. Mag., 1933, vol. 23, pp. 448–457.

floating the powder in heavy solution of diluted methylene iodide. There is herefore no evidence to suggest that this might be a barium-bearing plagioclase omparable with that in some of the other rocks examined. During the examination of this slide on the universal stage, about one crystal in three was found, in random survey, to be celsian. This amount of celsian would account for the tal BaO content of the rock, namely 11·79%.

The celsian (pl. XIV, fig. 1) is perfectly clear, and never twinned. It commonly hibits two perfect cleavages at 90°, fragments being perfectly rectangular in ape in broken parts of the section. The double refraction was determined in in section by means of the Berek compensator, and the refractive indices termined in sodium-light by the immersion method; β was taken half-way tween α and γ, 2V being nearly 90°. Other constants were measured on the iversal stage:

1·579, β 1·583, γ 1·588 ± 0·001, $\gamma - \alpha$ 0·010, 2V 88°, negative, $\beta = b$, $\gamma : a = 28°$.

To obtain material for analysis the rock was crushed and the portion between 100 and −200 mesh was used. The plagioclase and quartz were floated off in ightly diluted methylene iodide. This operation was repeated twice on the heavy mple. After drying, the ferromagnesian minerals were removed from the lsian with the aid of an electromagnet. This yielded a fairly pure sample, ntaminated with plagioclase, but very little else. An analysis of this sample is corded under I in table 1. An attempt was made to determine BaO on the main sion by recovering it from the Al_2O_3 and CaO, and precipitating the remainder s sulphate before MgO, but this was not successful. This method, as was indicated y some previous experimental work, tends to yield a BaO result several per cent. w. Therefore, another sample was separated yielding the result shown in II. his sample was richer in plagioclase. 0·3 gram was obtained altogether for the nalysis.

TABLE 1. Analysis of celsian from Broken Hill, N.S.W.

	I.	II.	III.	IV.	
SiO_2	37·5	—	35·1	2·11	4·00
Al_2O_3	27·8	—	26·8	1·89	
Fe_2O_3	nil	—	—	—	
MgO	nil	—	—	—	
CaO	2·3	4·8	—	—	
BaO	(30·1)	24·6	35·8	0·84	1·01
Na_2O	0·4	—	—	—	
K_2O	1·9	—	2·3	0·17	
Loss on ign.	(0·9)	0·9	—	—	
	100·9		100·0		

The calcium and sodium (evidently present as plagioclase) were calculated as onstituents of anorthite and albite. This gave a plagioclase closely equivalent o that determined optically, namely An_4Ab_1. The amount of BaO in column I as then calculated from II, and this figure (30·1%) is seen to yield a fairly satisactory total. All the potash is reserved for the celsian, as basic plagioclases are oor in this constituent; in any case, in the presence of barium the potash would end to go into the celsian. Column III will therefore approach very close to the ctual composition of the felspar. Column IV gives the ratios of the metal ions, alculated with respect to O = 8.

Comparison of the Broken Hill celsian with that of other occurrences.

There have been published descriptions of celsian from Sweden, Italy, Alaska, Wales, Japan, and California. The optical properties, specific gravity, and essential parts of the chemical analyses of all these are listed in table 2, together with those of this new record from Broken Hill, N.S.W.

On examining table 2 it will be observed that at the celsian end of the celsian–potash-felspar series there are too few data available for determining the relation between optical properties and composition. Only occurrences IV, V, and VII have sufficient data to work upon. Tacconi's analysis lacks alkalis, as well as having a peculiarly high alumina content. This could possibly be due to the retention of some BaO by the alumina precipitate; the BaO, if determined on a separate sample, would not, of course, be affected.

The present occurrence will be seen to occupy, in regard to its composition, a position between IV and VII. It is therefore interesting to note that all the optical and physical properties of V also lie between those of IV and VII. When the properties of the Broken Hill celsian are plotted on Winchell's[1] or Yosimura's (loc. cit., p. 372) variation diagrams for Ba-K-felspars, little or no agreement is found. There seems to be no continuous variation of optical properties from the pure potash- to the pure barium-felspar as shown in Winchell's graph.

TABLE 2. Comparison with celsian from other localities.

		I.	II.	III.	IV.	V.	VI.	VII.	VIII.
SiO_2	...	32·43	32·68	33·9	32·23	35·1	35·06	38·48	—
Al_2O_3	...	26·55	27·28	25·6	27·40	26·8	30·23	23·61	—
BaO	...	39·72	38·94	37·7	36·45	35·8	34·38	25·50	—
Na_2O	...	0·16	nil	—	0·77	—	—	1·85	—
K_2O	...	0·22	0·18	—	0·22	2·3	—	5·10	—
2V	...	—	nearly 90°	close to 90°	86° 22′	88°	83° 39′	80·5°	77°
Sign	...	positive	positive	positive	positive	negative	positive	negative	positive
α	...	—	1·580	1·584	1·5835	1·579		1·564	
							1·592		1·590
β	...	—	—	1·589	1·5886	1·583		1·568	
γ	...	—	1·590	1·596	1·5941	1·588	—	1·572	—
$\gamma : a$	...	—	28°	30°	28° 3′	28°	—	28–29°	28°
Sp. gr.	...	3·37	3·31	—	3·384	3·1–3·2	3.325	3·003	—

I. Celsian, Jakobsberg, Sweden. H. Sjögren, Geol. För. Förh. Stockholm, 1895, vol. 17, p. 578.

II. Celsian, Benallt mine, Rhiw, Wales. L. J. Spencer, Min. Mag., 1942, vol. 26, p. 236.

III. Celsian, Alaska range, Alaska. W. T. Schaller, Amer. Min., 1929, vol. 14, p. 321. [M.A. 4–237.]

IV. Celsian, Jakobsberg, Sweden. J. E. Standmark, Geol. För. Förh. Stockholm, 1903, vol. 25, p. 298.

V. Celsian, 'The Piggery', Broken Hill, New South Wales.

VI. Celsian, Candoglia, Piedmont, Italy. E. Tacconi, Zeits. Kryst. Min., 1907, vol. 43, p. 424; 1914, vol. 54, p. 388.

VII. Kasoite, Kaso mine, Japan. T. Yosimura, Journ. Fac. Sci. Hokkaido Univ., Ser. 4, 1939, vol. 4, p. 380. [M.A. 7–412.]

VIII. Celsian, Incline, Mariposa Co., California, A. F. Rogers, Amer. Min., 1932, vol. 17, p. 171. [M.A. 5–145.] The value for 2V was determined by the present author in a thin section on the universal stage.

[1] A. N. Winchell, Elements of optical mineralogy. 1933, p. 354.

Bragg[1] indicates that there is probably a change in the structure when a composition of about 15% BaO is reached. A break in properties at about this composition is indicated in Yosimura's diagram, and it seems that the relations of the members of this series can be best shown as two separate graphs. There is, however, need for additional accurate data (particularly towards the celsian end of the series) usefully to construct such diagrams. Yosimura's graph does not agree with the properties of the new celsian, and is based on data from very few occurrences. Much emphasis is also put upon the properties of kasoite, a mineral of peculiar composition, very deficient in silica. A re-examination of many of the occurrences with a view to obtaining more precise optical or chemical data is called for. Until then, it is hardly possible to establish a diagram which can with any accuracy represent the variation in properties with the composition in the celsian–potash-felspar series.

Calciocelsian.

The specimen (5081) containing calciocelsian is white in colour, containing only occasional patches and lenticles of biotite up to 2 cm. in length. It was collected within a few inches of the specimen containing ordinary celsian. It is an equigranular rock, the grain-size being about the same as the rock containing ordinary celsian, namely about 0·2 mm. Fine-grained irregular intergrowths of quartz and felspar are to be frequently seen. Felspar is the chief mineral constituent, making up about 90% of the rock. The rest is chiefly quartz, with a little biotite. Accessory minerals are apatite, magnetite, sphene, zircon, and orthite, the last altered, causing radial expansion cracks in the surrounding felspar. The biotite is the common red-brown variety with pleochroism α pale yellow, β and γ deep red-brown, and occasional pleochroic haloes. The felspars—plagioclase and calciocelsian—are both quite unaltered. The plagioclase is generally twinned, albite and pericline being the only twin-laws determined. The extinction-angle, α': (010), in albite twins in section normal to the (001) cleavage is 43°, and the optic axial angle (2V), 80°, with negative sign. These agree quite well for plagioclase of the composition An_{88}–An_{90}.

The second felspar is a variety of celsian containing about 4% CaO. The name calciocelsian is suggested for this mineral as indicating its relationship to the parent mineral, and at the same time indicating the point at which the difference occurs. The mineral is virtually indistinguishable from the plagioclase in sections. Its presence was only discovered when it was found that a fraction of the crushed rock sinking in bromoform contained a much higher percentage of barium than the original rock. In thin section of the rock, however, most, possibly all, of the untwinned felspar is calciocelsian. It rarely shows cleavages, and so, owing to the lack of crystallographic directions, is readily overlooked, even on the universal stage.

For analysis and determination of properties a portion of the rock was crushed and sieved. Material between −100 and −200 mesh was separated with bromoform, the calciocelsian and heavy minerals sinking. This was repeated several times on the heavy fraction. The heavy minerals were then removed with an electromagnet, the remaining powder being used for the analysis. Material between 60 and 100 mesh was treated similarly, the powder here obtained being

[1] W. L. Bragg, Atomic structure of minerals. 1937, p. 239.

used for the determination of optical properties. A Canada-balsam mount the powder was prepared for universal stage work. The properties thus obtain are set out and compared with other occurrences of celsian in table 3.

It can be seen from the table that the introduction of calcium into the celsi molecule, while not altering the orientation, has effected a considerable chan in the optical properties, the change in 2V being the most striking. A very nota change in physical properties is the cleavage. While the celsian from this loca had two exceptionally clear cleavages in thin section, cleavages could only occasionally seen in the grain mounts of the calciocelsian.

Table 3. Optical data of calciocelsian compared with those of celsian.

	I.	II.	III.
2V	86° 22′	88°	76°
Sign	positive	negative	negative
α	1·5835	1·579	1·572±0·001
β	1·5886	1·583	—
γ	1·5941	1·588	1·584±0·001
$\gamma : a$	28° 3′	28°	29°
	$\beta = b$	$\beta = b$	$\beta = b$
$\gamma - \alpha$	0·0106	0·010	0·012
Sp. gr.	3·384	3·1–3·2	—
Cleavages	(001), (010)	2 very perfect	2 distinct (on grains)

I. Celsian, Jakobsberg, Sweden. J. E. Strandmark, loc. cit., 1903.
II. Celsian, 'The Piggery', Broken Hill, New South Wales.
III. Calciocelsian, 'The Piggery', Broken Hill, New South Wales.

Table 4. Analyses of gneiss and calciocelsian.

	Rock.	Calciocelsian.	Metal ions.	
SiO_2	49·10	42·0	2·33	
TiO_2	0·17	—	—	4·00
Al_2O_3	25·42	25·8	1·67	
Fe_2O_3	0·04	—	—	
FeO	0·19	—	—	
MnO	0·005	—	—	
MgO	nil	—	—	
BaO	14·72	25·8	0·56	
CaO	7·65	4·0	0·24	0·93
Na_2O	1·68	0·3	0·03	
K_2O	0·73	1·4	0·10	
P_2O_5	0·06	—	—	
S	0·04	—	—	
Cl	0·04	—	—	
H_2O+	0·35	—	—	
H_2O-	0·08	—	—	
	100·28	99·3		

The chemical composition of the mineral is set out in table 4 together with t analysis of the lighter part of the gneiss. The deficiency of Ca, Ba, Na, K io is to be accounted for by the solubility of the calcium oxalate. Small amoun only were obtained for analysis, and considerable volumes had to be taken ensure separation from barium. The sample is considered to be free fr

ppreciable plagioclase. This is borne out by the increase of the $CaO : Na_2O$ tio in the mineral analysis, and the unusual composition is reflected by the ange in optical properties, particularly 2V and the refractive indices.

Hyalophane.

Hyalophane has been noted in two of the rocks collected, namely 5938 and 945. The latter is a dark grey rock with occasional white veins running through . It has the smooth weathered surface of many of the gneisses, owing to solu- on weathering. An analysis of the rock yielded 7·06% BaO, so that barium- lspars were searched for. The rock consists almost entirely of felspar, two of hich are present—hyalophane and plagioclase—in about equal proportions. he plagioclase is a fine irregular intergrowth in patches in the hyalophane. Its fractive index is greater than that of the hyalophane; it is untwinned and has an otic axial angle (2V) of about 87° positive, indicating a composition in the region $An_{70}Ab_{30}$.

The hyalophane occurs throughout the rock as a rather fine equigranular ggregate and it is clear, very rarely twinned or cleaved, looking remarkably like uartz (pl. XIV, figs. 2 and 3). It was identified by its low birefringence and low fractive indices, 2V 76°, and negative sign, and by the fact that only 0·96% aO was found in the acid soluble portion of the rock, hyalophane being insoluble acid.

Specimen 5938 is a coarser rock containing 4·64% BaO. It is white in colour, ie chief accessory being black iron-ore, probably ilmenite. In this rock plagio- ase of composition $An_{75}Ab_{25}$ predominates, quartz and hyalophane being less bundant.

The hyalophane forms crystal grains up to 1 mm. in diameter, not easily istinguishable at first sight from the quartz. It is occasionally intergrown in a icroperthitic fashion with plagioclase. It was distinguished by the same means s that in 5945, the optic axial angle (2V) measured on the universal stage being bout 77°, negative. According to Winchell (loc. cit., p. 360) this would indicate composition of about $Or_{75}Cn_{25}$. It was unfortunately found impossible to eparate satsfactory material for analysis from either of the specimens.

Barium-plagioclase.

A barium-plagioclase from this locality is the subject of a paper by S. R. Jockolds and E. G. Zies (loc. cit.). No comparable rock has been found in the eries under examination; only one was found to have a similar barium content, nd that was 5938 containing hyalophane. The relative BaO contents given by Jockolds and Zies for rock and felspar (4·8% and 5·7% respectively) are also eculiar in view of the fact that the rock contains only 50–60% felspar. However, ertain of the rocks examined have a much lower barium content, and it would eem probable that in these cases the barium is contained in the plagioclase. A umber of specimens were analysed; BaO contents were found in different speci- ens to be as follows: 5936, 2·22%; 5080A, 1·44%; 5934, 0·80%; 5935, 0·62%. bout half these figures were obtained for the acid soluble portion of the analyses. he rocks generally contain about 20% quartz. The felspars in each case were imilar in appearance, and only one or two will therefore be described.

Specimen 5936 is a moderately coarse rock with some quartz. It conta abundant sphene, often surrounding black iron-ore, probably ilmenite. Ho blende, biotite, chlorite, apatite, zircon, and zoisite are also present. The content indicates that the felspar contains about 3% BaO. The felspar generally twinned; albite and pericline were the only twin-laws determin Optical properties determined by the immersion method in sodium-light an the universal stage are:

$$\alpha\ 1{\cdot}564,\ \gamma\ 1{\cdot}573 \pm 0{\cdot}001,\ 2V\ 89°,\ \text{negative},\ \alpha' : (010) = 44°.$$

The optic axial angle and extinction-angle indicate a composition of $An_{74}A$ and $An_{71}Ab_{29}$ respectively on the ordinary plagioclase variation diagrams Chudoba.[1] The refractive indices are those of a normal plagioclase of t

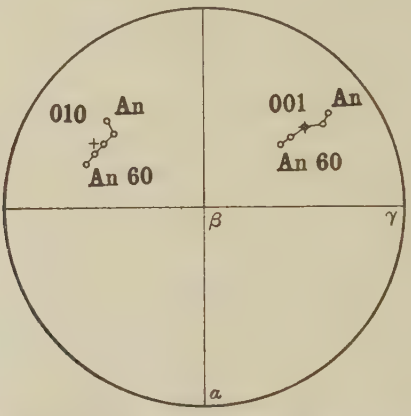


Fig. 1. Stereogram of the optic elements of plagioclase. Cleavage poles projected on to plane normal to β (after Emmons). Positions of cleavage poles of the felspar of rock 59 indicated by +.

composition. It will be seen from the stereographic projection of the elemer of this plagioclase (text-fig. 1) that its optical orientation is quite norm (Emmon's[2] graphs being used), the cleavage poles falling close to An_{80}. T slight discrepancy in values could possibly be caused by the barium content the felspar.

However, as the amount of the BaO present only represents about 7–8% of t celsian molecule in the felspar, it would not be safe to state definitely that above variations are real. This is further enhanced by the fact that the orientati variation diagrams as given by different workers vary slightly, resulting in variation band rather than line, this no doubt being due to the unknown eff of potash in the plagioclase series.

Specimen 5080A is a similar rock with only 1·44% BaO. The properties the felspar are almost identical with the above, except that the optic axial an (2V) was found to be 86° with negative sign. Numerous specimens were found contain smaller amounts of BaO. The felspars in these, as would be expect appeared quite normal plagioclases.

[1] K. Chudoba, The determination of the feldspars in thin section. 1933. [M.A. 5–386.]
[2] R. C. Emmons, The universal stage. Mem. Geol. Soc. Amer., 1943, no. 8. [MA. 9–1

n view of the appearance of hyalophane in some of the specimens, this mineral searched for, on the possibility that the barium might be present in that form he rocks of low BaO content, but it was not found.

istribution of the barium-felspars with respect to the amount of barium present.

he different felspars into which the barium enters is of special interest when sidered in relation to the total amount of barium present. It is not known what extent barium can enter into the plagioclase framework; the open nature he structure will, however, allow of a certain amount of replacement of calcium sodium by the larger ion. The plagioclase structure is somewhat contracted compared with the orthoclase structure, so that the introduction of barium r a small amount would render the framework unstable. As to how much ium could be introduced, there is no real data. Winchell (loc. cit., p. 319), h information from Alling,[1] has published a diagram of the miscibility fields albite–orthoclase–anorthite. The miscibility field of orthoclase–anorthite is wn to be small, orthoclase entering into the anorthite molecule only to the ent of 5% at low temperatures, and rising to 14% at high temperatures.

he rocks at present under examination may be divided up into three groups:

1) Those in which the barium has entered into the plagioclase structure. The O content of these varied from 0·62 to 2·22%.

2) Those in which the barium has combined with the available potash to m hyalophane, this accompanying a normal plagioclase. The two specimens his group contained 4·64 and 7·06% BaO respectively.

3) Those of high barium content, which form celsian.

Rock no. 5936, containing 2·22% BaO consists chiefly of quartz, and allowing the amount of mineral present, the plagioclase would contain about 8% of the sian molecule.

Turning now to rocks of higher barium content, we see the next example (5938) tains 4·64% BaO, in this case as hyalophane. It would seem then, that at a tain maximum but low barium concentration, this ion cannot be further orbed in the plagioclase structure, but immediately combines with potash sent to form hyalophane. This change, then, apparently takes place somewhere between a 3 and 5% BaO content of the total felspar molecules present. It ms probable, then, that basic plagioclases can only contain up to about % of the celsian molecule without radically altering the structure. It is sonable to suppose that the celsian and orthoclase molecules would enter o the plagioclase structure in comparable amounts, owing to the similar ionic ii of Ba and K. It is therefore interesting to note the similarity between these ires, and those of Alling given above for anorthite-orthoclase mixtures.

Another consideration in respect to this is the amount of potash present. The umption has been made above that enough potash would be present to form alophane. In the present case this condition appears to have been satisfied. potash were lacking, the excess barium would either have to come out as sian, or to remain in the plagioclase to a greater extent than intimated above. The behaviour of the barium as it reaches higher concentrations is the more aightforward. A specimen containing 7·06% BaO was found to be rich in

[1] A. L. Alling, Journ. Geol. Chicago, 1921, vol. 29, p. 193. [M.A. 3–33.]

hyalophane, but on reaching 10% BaO celsian was found to be the barium bearing mineral. This is what is to be expected in this series of gneisses rich both barium and calcium. The increase of these two constituents would have be at the expense of the alkalis, resulting in a K : Ba ratio too low for the for tion of hyalophane. Celsian would, then, have to be formed.

The position of the calciocelsian in this discussion is peculiar. Why and ho would form must have been dependent on special local conditions of composit The high calcium content of the rock may have some bearing on the case. I interesting to note, in connexion with this, the low diffusion limits, even in rat high grades of metamorphism. Garnet has been noted in a number of specimens; the small diffusion at this grade is shown by the fact that the sp mens containing celsian and calciocelsian were collected within a few inches.

The author is indebted to Mr. A. W. Kleeman, M.Sc., for useful suggestions a advice during the investigation, and to Mr. H. E. E. Brock for the photograp

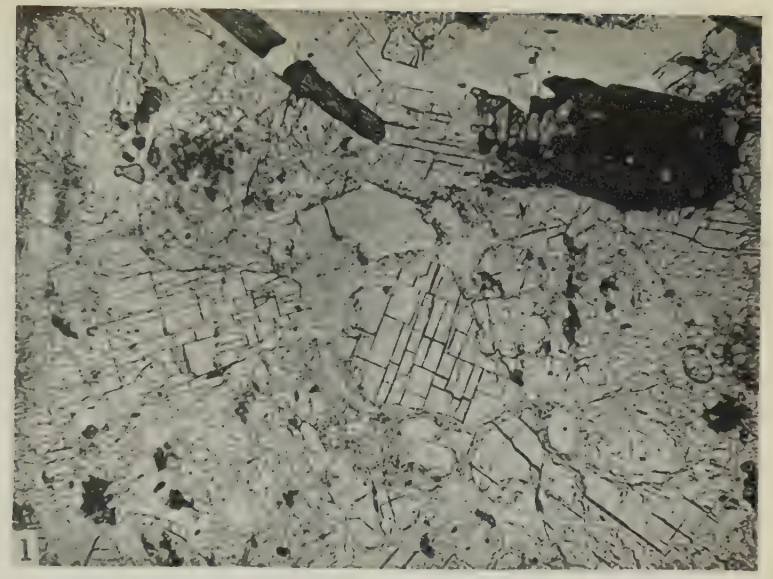
Summary.—A series of barium-rich gneisses has been examined with a view finding the form into which barium enters into the mineral composition. F barium-containing felspars have been described, one being a new variety of t barium-felspar celsian. The described minerals are celsian, calciocelsian, hya phane, and barium-plagioclase.

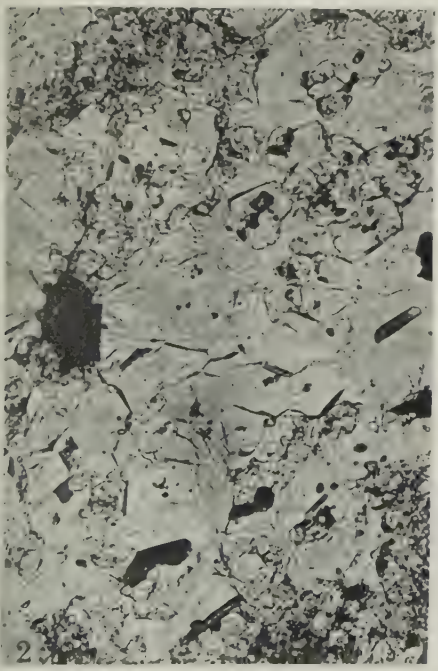
Explanation of Plate XIV.

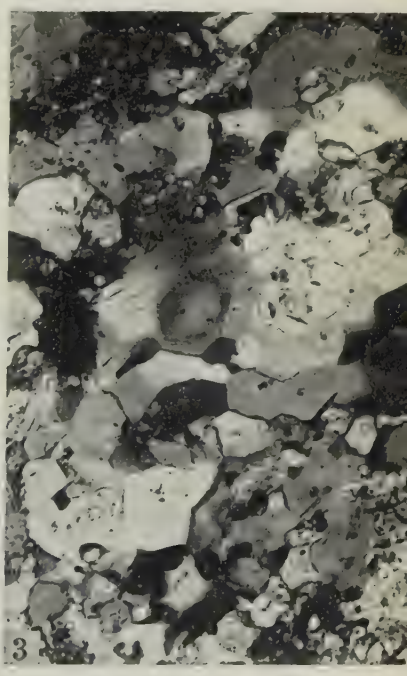
Fig. 1. Celsian, showing two perfect cleavages at 90°. Plagioclase, quartz, hornblende (dark sphene (high-relief grains near hornblende), and apatite also present. Ordina light. ×55.

Fig. 2. Hyalophane, clear and untwinned. The smaller turbid grains are chiefly untwinne plagioclase. Ordinary light. ×76.

Fig. 3. Same as fig. 2, crossed nicols. Shows zoning in some hyalophane crystals.







E. R. Segnit: Barium-felspars from Broken Hill, New South Wales.

MINERALOGICAL ABSTRACTS

(Vol. 9, No. 9, March, 1946.)

New Minerals

HUBNIKOVA (O. M.) Шубникова (О. М.). Новые минералы, открытые в СССР (1918–1939 гг.). *New minerals discovered in the U.S.S.R. (1918–1939).* Труды Инст. Геол. Наук СССР, 1940, no. 31 (Мин.-Геохим. Сер., no. 6) [Trans. Inst. Geol. Sci. U.S.S.R., no. 31 (Min.-Geochem. Ser., no. 6)], pp. 1–6.

A list is given of the names with the chemical formulae of 99 species and arieties discovered in the U.S.S.R., together with other new mineral names ntroduced in the Russian literature during the same period. [M.A. **9**–125.]

L. J. S.

ЗЕТЕКНТІN (A. G.) Бетехтин (А. Г.). О генетических типах марганцовых месторождений. *Genetic types of manganese deposits.* Изв. Акад. Наук СССР, Сер. Геол. (Bull. Acad. Sci. URSS, Sér. Géol.), 1944, no. 4, pp. 3–46. (Russian with English summary.)

A general review of the genetic types and of the geochemistry of manganese eposits is given, and the following types of deposits are discussed. I. Marine eposits: (*a*) associated with siliceous chemical and organogenic sediments, com- rising pisolitic and massive psilomelane and pyrolusite ores, manganite ores and arbonate ores; (*b*) associated with calcareous sediments—manganocalcite ores; c) associated with clastic sediments, with psilomelane, pyrolusite, and man- anese carbonates as cementing material. II. Lake and bog deposits, usually omposed of a mixture of hydroxides of manganese and iron. III. Regionally netamorphosed deposits varying from low-grade metamorphosed ores such as raunite and hausmannite ores to high-grade metamorphosed ores characterized y manganese silicates. The metamorphosed deposits also include lenses and eins of concentrated ore, and some of these veins have a resemblance to veins of ydrothermal origin, but are free from lead, zinc, silver, and gold. IV. Hydro- hermal and contact metasomatic deposits. V. Deposits formed through the rocess of weathering; a characteristic mineral of this type of deposit is the ydrate of manganese dioxide ($MnO_2.pH_2O$), named *vernadite* by the author in onour of V. I. Vernadsky. It occurs as compact colloform masses of black colour r in a finely dispersed state of reddish colour, and is considered to be a manganic cid the various salts of which give rise to minerals of the psilomelane group Nature, London, 1945, vol. 156, p. 87].

S. I. T.

ERDYUCHENKO (D. P.). *Alumino-chrysotile, a member of the isomorphous series serpentine-parakaolinite.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1945, vol. 46, pp. 117–118.

A hard, flattened fibrous chrysotile (fibres 15–20 cm.) at the contact of serpen- inite and granite from Markopidj river, northern Caucasus, gave SiO_2 42·54,

Al_2O_3 5·68, Fe_2O_3 1·06, FeO 0·74, MgO 35·57, CaO 0·13, H_2O+ 13·26, H_2O- 0·38 = 99·36, and is named alumino-chrysotile in the series $H_4(Mg_3,Al_2)Si_2O_8$. L. J. S

Kašpar (Jan Václav). *O novém přirozeném křemičitanu železitém.* [On a new natural ferric silicate.] Rozpravy České Akad., 1941, vol. 51, no. 14, 8 pp.

Limonite-like encrustations on crystals of pyrrhotine, with associated chalybite, cronstedtite, and quartz, from Chiuzbaia (= Kisbánya), Romania, have sp. gr. 2·075, H. 2½, *n* 1·608, isotropic, and gave SiO_2 28·79, Fe_2O_3 40·20, FeO 1·00, S 0·82, $H_2O(+240°)$ 6·97, $H_2O(-240°)$ 22·96 = 100·74; formula $H_4Fe_2Si_2O_9.5H_2O$ confirmed by the dehydration curve. The mineral is named *němecite*, and is believed to be the crystalline phase of the amorphous hisingerite. [Hisingerite is cryptocrystalline, and the mineral is probably identical with this; compare canbyite [M.A. 2–253].] F. S.

Rost (Rudolf). *Doplňky k mineralogii hořících hald na Kladensku.* [Supplement to the mineralogy of the burning heaps in the region of Kladno.] Rozpravy České Akad., 1942, vol. 52, no. 25, 4 pp. German abstract in Bull. Internat. Acad. Sci. Bohême, 1943, vol. 43 (for 1942), pp. 276–279.

The following additional minerals are recorded from the burning heaps at Libušín in the coal basin of Kladno, Bohemia [M.A. 7–11]. Crusts of cryptohalite $(NH_4)_2SiF_6$, which crystallizes from aqueous solution as octahedra with sp. gr. 1·990, *n* 1·373. Phthalimide $C_6H_4(CO)_2NH$ as a new organolithic mineral is named *kladnoite*; the monoclinic crystals are of 'ruler' habit with predominant (100) and prisms (110), (230), (120); sp. gr. 1·47, α 1·501, β 1·519, γ 1·755, $\gamma = b$, $\beta : c$ about 16°; melting-point 233–235° C. F. S.

Pough (Frederick H.) & Henderson (Edward P.). *Brasilianita, um novo fosfato mineral.* Mineração e Metalurgia, Rio de Janeiro, 1945, vol. 8, p. 334, 2 figs.

——— *Brasilianite, a new phosphate mineral.* Anais Acad. Brasileira Cienc. 1945, vol. 17, pp. 15–16.

——— *Brazilianite, a new phosphate mineral.* Amer. Min., 1945, vol. 30, pp. 572–582, 1 col. pl., 9 text-figs.

Large (up to 13 cm. and 973 grams) well-developed, yellow to greenish-yellow crystals of gem quality (previously thought to be chrysoberyl or fremontite) are monoclinic with $a : b : c = 1·1056 : 1 : 0·6992$, β 82° 38′, with perfect (010) cleavage; 18 crystal-forms are listed and the surface characters described. Sp. gr. 2·94, H. 5½, α 1·598, β 1·605, γ 1·617, 2V 60–70°, positive. Analysis, P_2O_5 37·97, Al_2O_3 43·82, Na_2O 8·42, K_2O 0·37, H_2O 9·65, Cl trace = 100·23, gives $Al_3Na(PO_4)_2(OH)_4$. An X-ray powder photograph is contrasted with those of fremontite, amblygonite, and montebrasite. The mineral is from pegmatite at a locality near Arrasuahy or Conselheira Pena in Minas Geraes. L. J. S.

Kerr (Paul F.) & Holmes (Ralph J.). *X-ray study of the tantalum mineral simpsonite.* Bull. Geol. Soc. Amer., 1945, vol. 56, pp. 479–504, 4 pls., 5 text-figs.

Re-examination of simpsonite from Tabba Tabba, Western Australia [M.A. 7–369] and of calogerasite from Giz hill, Brazil [M.A. 9–127] (anal. I), together

with data for dark brown irregular crystals ($\frac{1}{2}$ inch) with pegmatitic felspar from Bikita, Southern Rhodesia (anal. II), prove the identity of these minerals, with the formula $3Al_2O_3.2Ta_2O_5$. The analyses of material from Tabba Tabba are interpreted as containing about 30% of admixed microlite. Goniometric measurement of yellow-brown hexagonal crystals from Giz hill gave $a : c = 1 : 0{\cdot}6135$. Analysis III is of microlite from Onça near Picuí, Brazil.

	Ta_2O_5.	Nb_2O_5.	Al_2O_3.	FeO.	CaO.	Total.	Sp. gr.	ω.	ϵ.	a.	c.
I.	71·54	1·82	25·20	0·16	0·12	99·86	6·700	2·0402	1·9944	7·3766	4·5141Å.
II.	67·92	1·61	25·06	3·65	0·12	99·83	—	2·06	2·03	—	—
III.	74·37	5·45	0·83	1·24	15·48	100·24	—	2·08	—	10·3979	—

Analyses by R. W. Hoffman. I, also SiO_2 1·00, TiO_2 0·02. II, also SiO_2 0·50, TiO_2 0·05, MnO_2 0·44, MgO 0·01, SnO_2 0·47. III, also SiO_2 0·75, TiO_2 0·83, F 1·29.

L. J. S.

Pough (Frederick H.). *Simpsonite and the northern Brazilian pegmatite region.* Bull. Geol. Soc. Amer., 1945, vol. 56, pp. 505–514, 4 pls., 3 text-figs.

Tantalite, tapiolite, microlite, and simpsonite, together with beryl, are mined from kaolinized pegmatite veins at Giz hill (Alto do Giz) near Equador in Rio Grande do Norte, and 25 km. NE. at Onça mine near Picuí in Paraíba. These minerals usually occur in a coarse band near the margin of the quartz core of the veins. Simpsonite is bipyramidal hexagonal (C_{6h}) with $a : c = 1 : 0{\cdot}60978$, forms $c\ m\ a$, $H(21\bar{3}0)$, $x(10\bar{1}1)$, $y(20\bar{2}1)$, $d(22\bar{4}1)$, &c.; white to yellow-brown, adamantine lustre, blue or yellowish fluorescence, sp. gr. 6·81, H. $7\frac{1}{2}$, ω 2·045, ϵ 2·005, uniaxial negative (not positive). Microlite as green octahedra often altered to cream-coloured; sp. gr. 6·03. Black tantalite as crystals up to 5 kg. and red-brown manganotantalite rich in crystal-forms. Other minerals are stibiotantalite, bismutite, and cyrtolite. L. J. S.

Guimarães (Djalma). *Arrojadita, um novo mineral do grupo da wagnerita.* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1942, no. 30 (Mineralogia no. 5), pp. 3–16, 2 figs. (Portuguese with English summary.)

Reprint of the 1925 paper [M.A. **3**–113] with some additions. New data for arrojadite are γ 1·657, $\gamma - \alpha$ 0·0079, $\gamma - \beta$ 0·0034. Optic axial plane (010), $\alpha : c = 3\frac{1}{2}°$, 2V 82°, negative. The dark red alteration product is probably monoclinic, α 1·703, β 1·703, γ 1·724, 2V 16° positive, extinction $2\frac{1}{4}°$ in cleavage plane; pleochroism, α bright yellow, β orange-yellow, γ dark red. The relation to headdenite is discussed and priority claimed for the name arrojadite [M.A. **3**–102, 180; Min. Mag. **26**–342]. L. J. S.

Fornaseri (Mario). *Sulla probabile identità della arrojadite con la triplite.* Periodico Min. Roma, 1943, vol. 14, pp. 35–41, 2 figs.

A specimen of arrojadite from Brazil [M.A. **3**–113] is dark greenish-brown with poor cleavages. Optical and X-ray examination indicate monoclinic symmetry. Optic axial plane (010) and perpendicular to the more distinct cleavage, 2V 76° 30′ (Na), positive; pleochroism, α yellow, β pale yellow, γ greenish-yellow. Rotation and Weissenberg X-ray photographs gave a 5·99, b 6·80, c 5·01Å., β 73° 42′ (compared with a 12·03, b 6·46, c 10·03Å., β 74° 18′, for triplite [M.A. **8**–11]). Analysis gave P_2O_5 31·96, Fe_2O_3 0·10, FeO 29·40, MnO 25·97, MgO 1·60,

CaO 8·10, Na_2O 0·10, K_2O trace, H_2O+ 1·02, H_2O- 0·20, F 5·50 = '102·95' sp. gr. 2·31, agreeing with $R''PO_4F$. [M.A. **8**–102, 180; **9**–63.] L. J. S.

Kerr (Paul F.). *Cattierite and vaesite: new Co-Ni minerals from the Belgian Con* Amer. Min., 1945, vol. 30, pp. 483–497, 3 figs.

Cattierite, CoS_2, from Shinkolobwe mine, Katanga, is granular with pink s colour, *a* 5·52346 Å.; analysis by J. Vaes, S 51·32, Co 41·40, Ni 3·20, Fe 3·1 Cu 0·59, SiO_2 0·08 = 99·86. Vaesite, NiS_2, from Kasompi mine, Katanga, a crystals of octahedral or cubic habit and grey colour, *a* 5·66787 Å.; analysi S 51·22, Ni 44·58, Fe 0·95 = 96·75. Both have the pyrite structure and cub cleavages. They were detected in polished drill cores, with dolomite, pyrite, an a mineral of the linnaeite-polydymite series (R_3S_4, with spinel structure). A triangular diagram FeS_2–NiS_2–CoS_2 shows these near two corners, with bravoite in the central area, and nickelian pyrite with >80% FeS_2 in the pyrite corner. CoS_2 and NiS_2 have been prepared artificially [M.A. **3**–339]. [Min. Mag. **25**–60 M.A. **8**–285.] L. J. S.

Neumann (Henrich). *Armenite, a water-bearing barium-calcium-alumosilicate* Norsk Geol. Tidsskrift, 1941, vol. 21, pp. 19–24, 4 figs.

Additions to a previous note [M.A. **7**–468]. The pseudo-hexagonal crystals are interpenetrating twins at about 120° of three orthorhombic individuals with perfect (010) cleavage and less perfect prismatic cleavage. The acute bisectrix coincides with the pseudo-hexagonal axis and $\gamma \perp (010)$, $\gamma-\alpha$ 0·0034, hence γ 1·562 sp. gr. 2·76. Analysis by L. Lund, SiO_2 46·18, Al_2O_3 27·52, BaO 12·37, SrO 0·04 CaO 9·99, Na_2O 0·16, K_2O 0·13, H_2O+ 3·41, H_2O- 0·11 = 99·91. Most of the water is lost at 450–600°. An alternative formula is given as $BaCa_2Al_6Si_9O_{30}$ $2H_2O$, and the mineral is compared with milarite. L. J. S.

Du Rietz (Torsten). *Kribergit, ett nytt mineral från Kristinebergs gruva i Västerbottens län.* Geol. För. Förh. Stockholm, 1945, vol. 67, pp. 78–79.

A white, compact, chalk-like mineral filling crevices in cupriferous pyrite gave on analysis by B. Helger P_2O_5 31·27, SO_3 13·05, Al_2O_3 38·45, MgO 0·02, V 0·003 H_2O+ 17·22 = 100·01, agreeing approximately with $2Al_2O_3.2(P_2O_5,SO_3).5H_2O$. Sp. gr. 1·92, *n* 1·484, $\gamma-\alpha$ about 0·002, but variable. Under the microscope it shows a felted lamellar to spherulitic structure. X-ray powder photographs show five weak lines indicating a low degree of symmetry. L. J. S.

Mélon (J.). *La viséite, nouvelle espèce minérale.* Ann. Soc. Géol. Belgique, 1943 vol. 66, Bull. pp. B53–B56. [M.A. **9**–88.]

Four partial analyses by A. Jorissen given in the original paper show P_2O_5 19·23–22·11, SiO_2 9·20–10·43, Al_2O_3 25·42–26·69, CaO 14·67–14·90, Na_2O 1·77 F 0·67, H_2O 23·78–27·99. Loss on heating at 110° 9·02, at 200° 14·50, at 400° 25·44, on ignition 27·99%. L. J. S.

Rao (B. Rama). *'Kyanophylite'—a new mineral of the hydrous aluminium silicate group, derived from kyanite, from Mavinhalli, Mysore.* Current Sci. Bangalore 1945, vol. 14, p. 196.

Loose lumps of an apple-green mineral, resembling talc or chlorite in appearance were found in an area of kyanite-graphite-schist. Thin sections show plumose

aggregates with n 1·58–1·60 and low birefringence. Analysis gave SiO_2 45·20, Al_2O_3 41·04, MgO 0·0, CaO 3·72, Na_2O 3·84, K_2O 0·73, ignition (mostly water) 5·00. L. J. S.

Naidu (P. R. J.). *On the nomenclature of a blue amphibole from Mysore.* Quart. Journ. Geol. Mining Metall. Soc. India, 1944, vol. 16, p. 138.

The blue amphibole from Mysore [M.A. **8**–160, 314] differs from pargasite from Finland and Canada in containing 32·26% of the glaucophane molecule $(Na,K)AlSi_2O_6$, with 32·44% of the pargasite molecule $CaMgSi_2O_6$, 17·18% $FeSiO_3$, &c. It is thus intermediate between glaucophane and pargasite, and is called *glaucopargasite.* L. J. S.

Ramaseshan (S.). *Mahadevite—a new species of mica.* Proc. Indian Acad. Sci., Sect. A, 1945, vol. 22, pp. 177–181.

Sheets (18 × 14 inches) of a bronze-coloured mica occur in pegmatite in the Warangal district, Hyderabad. Thick pieces are opaque, but 1 mm. cleavage flakes are transparent and greenish-yellow. Optic axial plane ⊥(010), 2E 13° 48′, negative, weak pleochroism. Two analyses gave SiO_2 38·98 (38·24), Al_2O_3 29·94 (29·20), Fe_2O_3+FeO 4·12 (3·86), MgO 13·20 (14·4), CaO 0·49 (0·50), Na_2O+K_2O 9·6 (9·2), H_2O 3·8 (3·8) = 100·13 (99·20), formula $(Al,Fe,Mg)_{2\cdot66}(K,Na,Ca)_{0\cdot97}H_{1\cdot73}(Si,Al)_4O_{12}$. In the amounts of Al and Mg it is intermediate between muscovite and phlogopite. L. J. S.

Fermor (*Sir* Lewis L.). *Manganese in industry.* (William Menelaus memorial lecture.) Proc. South Wales Inst. Engin., 1945, vol. 61, pp. 27–46, 5 pls., 9 text-figs.

Manganese is reviewed under the headings mineralogy, geology, mining, metallurgy, and utilization. In a footnote to the table of ore-minerals, the potassium- and barium-bearing varieties of psilomelane are distinguished as cryptomelane [M.A. **8**–310] and *protomelane* respectively. L. J. S.

Partridge (F. C.) [1903–1939]. *Trevorite and a suggested new nickel-bearing silicate from Bon Accord, Sheba siding, Barberton district.* Trans. Geol. Soc. South Africa, 1944, vol. 46 (for 1943), pp. 119–126, 1 pl.

Polished sections of trevorite [M.A. **2**–249] show a granular aggregate of isotropic octahedral material, with some magnetite, little millerite, and an apple-green mineral in the interspaces. The last has a micaceous cleavage, H. 2–2½, $d_4^{15\cdot6}$ 3·037, α 1·605, γ 1·650, 2V 14°, negative, weak pleochroism, α yellowish-green, γ bluish-green. Analysis by H. J. Weall, SiO_2 47·1, Fe_2O_3 6·65, FeO 1·15, NiO 30·6, CoO 3·5, MgO 9·45, H_2O+ 1·45, H_2O− 0·2 = 100·1, gives a formula $R_{14}Si_{16}O_{44}(OH)_4$ similar to that of talc, but with Mg largely replaced by Ni. L. J. S.

Precious Stones

Pfund (A. H.). *The identification of gems.* Journ. Optical Soc. Amer., 1945, vol. 35, pp. 611–614, 4 figs.

The reflecting powers of a polished facet for infra-red rays of different wavelengths, determined with an infra-red spectrometer (rock-salt prism, thermopile,

and galvanometer), when plotted against the wave-lengths give a characteris curve. With birefringent crystals the reflecting power, but not the shape of t curve, varies with the orientation of the crystal. Curves are given for diamo corundum, beryl, topaz, tourmaline, zircon, quartz, and glass, all of them ve different in character. For diamond the reflecting power for infra-red rays low and does not vary with the wave-length, the curve being a straight line.

L. J. S.

[Grum-Grzhimailo (S. V.)] Грум-Гржимайло (С. В.) Groom-Grjimailo (S. V. Об окраске минералов, вызываемой хромом.—*On the colouring of mine caused by chrome.* Труды Лаб. Крист. Акад. Наук СССР (Trav. Lab. Cris Acad. Sci. URSS), 1940, no. 2, pp. 73–86, 21 figs. (English summary, p.

Absorption curves (λ3600—4400 Å.) are given for spinel, ruby, kotschube t rhodochrome, alexandrite, Cr-nontronite, Cr-idocrase, uvarovite, fuchs t wolchonskoite, emerald, lavrovite, and kyanite, all of them minerals contain Cr_2O_3 (0·03–19·6%), but ranging in colour from red and lilac to green and bl Throughout this series the maximum absorption shifts from 5350 to 6300 Å. a the minimum from 4800 to 5500 Å. This is related to an increase in the amou of Cr with a corresponding increase in the size of the unit cell and decreasi polarization of the Cr ions. Pleochroism is suggested to be due to polarization the ions caused by the unsymmetrical deformation of electronic orbits, and to t unsymmetrical position of the Cr ion inside an octahedral group of oxygen ion The absorption curve of crocoite (containing CrO_3) is of quite a different type.

L. J. S.

Anderson (B. W.). *Gemstones and the spectroscope.* Gems & Gemology, Lo Angeles, California, 1944, vol. 4, pp. 164–167.

—— *Gemstones and the spectroscope. Absorption spectra due to chromium.* Ibid 1944–45, vol. 4, pp. 180–181, 1 fig.; 1945, vol. 5, pp. 203–204, 1 fig. [Th pagination of 'vol. 5' runs on from vol. 4.]

—— *Absorption spectra of pyrope garnet and red spinel.* Ibid., 1945, vol. 5 pp. 232–233, 257–258.

Hints on the use of the spectroscope, particularly the microspectroscope [M.A 1–230], with details of the absorption spectra of ruby, pyrope, and spinel. Wit a small direct-vision spectroscope a parcel of stones can be quickly looked ov and those showing prominent absorption spectra picked out. L. J. S.

Gübelin (Edward). *Gemstone inclusions.* Gems & Gemology, Los Angele California, 1944, vol. 4, pp. 142–149, 158–163, 174–179; 1945, vol. 5, pp. 205 210; 48 figs. [The pagination of 'vol. 5' runs on from vol. 4; and the thir instalment is dated 'Winter, 1944–45'.]

Good photomicrographs are given of inclusions in sapphire, ruby, and emerald to illustrate differences between natural and artificially produced stones. I addition to liquid and gas inclusions, the natural stones also contain solid inclu sions: in sapphire of haematite and rounded grains of corundum; in ruby rutile and zircon (with pleochroic haloes); and in emerald of tourmaline an calcite. Inclusions in diamond are diamond crystals and zircon; cleavage crack are also shown.

L. J. S.

Gübelin (Edward). *Inclusions as a means of identification.* Gems & Gemology, Los Angeles, California, 1945, vol. 5, pp. 226–231, 242–247, 16 figs.

Photomicrographs are given of byssolite, diopside, hornblende, zircon, quartz, &c., in garnets. L. J. S.

D'Ascenzo (Nicola Goodwin). *The gem-table.* Second edition, Philadelphia, Pennsylvania, 1945, single sheet 51 × 43 cm. Price $1.00.

Gemstones, including several unusual species, are listed in the order of their specific gravity (amber 1·05 to stibiotantalite 7·40) and refractive index (fluorite 1·43 to proustite 3·00) with mention of their colours, chemical composition, and principal localities. The name corundum is replaced by korunduvite. L. J. S.

Shipley (Robert M.). *New and old novelty styles of brilliant cutting.* Gems & Gemology, Los Angeles, California, 1945, vol. 5, pp. 194–200, 14 figs.

Various modifications of the brilliant form of cutting are illustrated. L. J. S.

Symposium of papers on the structure and properties of diamond. Proc. Indian Acad. Sci., 1944, vol. 19, no. 5, pp. 189–342. [M.A. **9**–105.]

Günther (Paul L.), Geselle (Paul), & Rebentisch (Wolfgang). *Untersuchungen zum Diamantproblem.* Zeits. Anorg. Chem., 1943, vol. 250, pp. 357–372, 7 figs. Translation in Industrial Diamond Review, London, 1946, vol. 6, pp. 42–46, 7 figs.

Unsuccessful attempts at the artificial production of diamond [M.A. **9**-88]. L. J. S.

Sansom (W. J.). *Glossary of technical terms used in the diamond industry.* Industrial Diamond Review, London, 1945, vol. 5, pp. 202–207.

A useful list of explanations of terms used in connexion with diamond tools and ornaments, with some mineralogical terms. L. J. S.

Peters (Chauncey G.), Nefflen (Karl F.), & Harris (Forest K.). *Diamond cutting accelerated by an electric arc.* Journ. Res. Nat. Bur. Standards U.S.A., 1945, vol. 34, pp. 587–593, 3 pls., 1 text-fig. Abstract: Industrial Diamond Review, London, 1945, vol. 5, pp. 288–292, 5 figs.

The grinding lap and the dop are connected with the secondary terminals of a 5000-volt power transformer with 0·5 ampère through the primary. A bluish arc is seen at the contact and the cutting is materially increased, it then being even possible to cut on an octahedral face. Similar results were obtained in the process of sawing diamond. L. J. S.

Ball (Sydney H.). *The diamond industry in 1943.* Jewelers' Circular-Keystone, New York, 1944, reprint 24 pp., 3 figs.

—— *The diamond industry in 1944.* Ibid., 1945, 24 pp., 2 figs.

The report for 1944 is the twentieth in this series [M.A. **7**–519; **8**–268; **9**–47]. Production shows a steady increase owing to the demand for stones for industrial purposes. In 1944 it is estimated at 11,400,000 carats (2·28 metric tons) of which 88% was for industrial diamonds and the remainder for gems. The Belgian Congo

produced 80% (of which 93% was industrial), while the British Empire produce only 23% by weight, but 58% by value. The United States imports of industri diamonds show a sharp rise to 12,172,679 carats in 1944. L. J. S

Herz (Paul L.). *Diamond characteristics and the Wegener theory.* Gemmologi London, 1945, vol. 14, pp. 37–38, 43–45, 2 figs. (maps).

The characters of the diamonds of Africa and South America are compared i connexion with the Wegener hypothesis of the drift of continents. L. J. S

Friedlaender (C.). *Diamantengewinnung in Afrika.* Vierteljahrschr. Naturfo Gesell. Zürich, 1944, vol. 89, pp. 187–210, 8 figs.

A lecture delivered to the Geological Society of Zürich, giving a general accou of the discovery of the several diamantiferous deposits in Africa (except in French colonies), modes of occurrence, and working. While the kimberlite pi are of late Cretaceous age, alluvial deposits are pre-Cambrian (Witwatersrand Triassic (Southern Rhodesia and Belgian Congo), Eocene–Miocene (South-We Africa), later Tertiary and Pleistocene to Recent. Four of the illustratio are maps. L. J. S.

H[owling] (G. E.). *Sierra Leone produces world's largest alluvial diamond.* Bu Imp. Inst. London, 1945, vol. 43, p. 55.

A stone weighing 770 carats, of fine colour and quality, was found in Januar 1945, and is the third largest gem diamond from Africa. Stones of [about] 53 and 250 carats were found in 1943. [M.A. 7–127.] L. J. S.

Gordon (W. T.). *A note on some large diamonds recently recovered from the grave of the Woyie river, Sierra Leone.* Bull. Imp. Inst. London, 1945, vol. 4 pp. 111–120, 2 pls., 6 text-figs.

Three large diamonds found since 1943 weigh 249·25, 532, and 770 carats. Th largest was found in January 1945. It is probably the largest diamond yet foun in an alluvial deposit. In shape it is a four-sided, truncated pyramid on a lozenge shaped base and its approximate dimensions are $71 \times 53 \times 32$ mm. One natura octahedral face shows well-developed triangular pits. Two faces are cleavage one remarkably perfect. The crystals are fully described and an attempt is mad to deduce from their characters their history from their formation in an intra telluric stage to their discovery in the river gravels. W. C. S.

Holden (Roy J.). *The "Punch" Jones and other Appalachian diamonds.* Bul Virginia Polytechn. Inst., 1944, vol. 37, no. 4 (Engin. Experm. Statio Series no. 56), 32 pp., 5 figs.

A diamond was found in 1928 by a boy, William P. Jones, when pitchin horseshoes on the flood-plain of Rich creek at Peterstown, [Monroe Co.], Wes Virginia. It weighs 6·8920 grams (34·46 carats) and measures 19 mm. along th cubic axis; 48 rounded faces of a hexakis-octahedron are present. It is white wit a slight greenish tinge; sp. gr. 3·530. The surface shows minute percussio markings. An X-ray Laue photograph shows elongated streaks. A list is give of 27 authentic finds of alluvial diamonds (beyond the limits of the glaci

leposits) in the Appalachian region, mostly in gold washings in North Carolina nd Georgia. The largest previously known was the 'Dewey' diamond of 23¾ carats found at Manchester, Virginia, in 1855. L. J. S.

LEONARDOS (O. H.) & SALDANHA (R.). *Diamante "Darcy Vargas" e outros grandes diamantes Brasileiros.* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1939, no. 18 (Mineralogia no. 3), pp. 3–27, 11 figs. (Portuguese with Latin summary.)

The 'Darcy Vargas' diamond [M.A. 8–121] was found in 1939 in alluvium of he Santo Antônio river, Coromandel, Minas Geraes. It is perfectly transparent, ut has a chestnut tint; weight 460 carats, sp. gr. 3·517. Descriptions are given f 28 large diamonds that have been found in Brazil; and 58 of the larger dia- nonds of the world are tabulated with their weights in the rough and when cut. L. J. S.

SALDANHA (R.). *O diamante Coromandel.* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1941, no. 21 (Mineralogia no. 4), pp. 15–23, 8 figs. (Portuguese with English summary.)

The 'Coromandel' diamond, found in 1940 in alluvium of the Santo Antônio iver, Coromandel, Minas Geraes, weighs 100·65 carats and has sp. gr. 3·530. It s of octahedral habit with a cube face and five cleavage surfaces, and is clear with extremely slight colour. L. J. S.

SALDANHA (R.). *O diamante "Governador Valadares".* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1942, no. 30 (Mineralogia no. 5), pp. 17–23, 5 figs. (Portuguese with English summary.)

A blue-white diamond of 108·30 carats from the Estrela do Sul district, Minas Geraes, has a rough cylindrical form, 55 mm. long and 13–16·4 mm. thick. It is elongated along [011] and shows rounded faces of (100), (111), and (110). The 'Estrela do Sul' ('Star of the South') diamond was found in this district in 1853. L. J. S.

OZEROV (K. N.). *Form of corundum crystals as dependent upon chemical composition of medium.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1945, vol. 47, pp. 49–52, 8 figs.

Four types of habit are distinguished: pyramidal, prismatic, rhombohedral, and pinakoidal. The first three are characteristic of basic and alkalic igneous rocks and marbles, and the last of siliceous rocks often with associated sillimanite. The several methods of artificial production of corundum support this view. Temperature, pressure, and concentration of solution appear to have no influence on the habit of the crystals. Examples from various localities are tabulated [but some obvious exceptions are omitted]. L. J. S.

GELLER (R. F.) & YAVORSKY (P. J.). *Melting point of alpha-alumina.* Journ. Res. Nat. Bur. Standards U.S.A., 1945, vol. 34, pp. 395–401, 1 fig.

Artificial colourless corundum (Al_2O_3 99·99%) and other samples of α–Al_2O_3 gave melting-point 2000–2030° C. L. J. S.

Seeman (A. K.). *American-made synthetic crystals.* Journ. Gemmology, Wa maker, Jeweller & Silversmith, 1944, vol. 70, pp. 501–503, 3 figs.

Short account of the manufacture of synthetic corundum and spinel in United States by the Verneuil process. Absolute purity of the alumina used control of particle size (less than 0·1μ) were found to be of the highest importa In addition to boules of the usual form, it is now possible to produce long sl crystals known as corundum rod suitable for the shaping of pivot supports W. C

Winchell (Horace). *Orientation of synthetic corundum for jewel bearings.* A Min., 1944, vol. 29, pp. 399–414, 10 figs.

The orientation of boules and of worked jewel bearings was determined back-reflection X-ray Laue photographs, checked by optical tests, and the r plotted on petrofabric diagrams, in order to find the optimum method of wo The angle between the growth-axis and the *c*-axis may vary 0–90° (us 30–80°); both lie in the parting plane along which the boules split longitudi The parting plane lies in the prism zone, usually near $(10\bar{1}0)$ or $(11\bar{2}0)$, and be smooth or rough. The most favourable orientation of the growth- appears to be near the normal to $(11\bar{2}2)$ or $(81\bar{9}0)$. L. J.

Brown (K. W.), Chirnside (R. C.), Dauncey (L. A.), & Rooksby (H. *Synthetic sapphires.* G[eneral] E[lectric] C[ompany] Journ. London, vol. 13, pp. 53–59, 5 figs.

Historical summary of early attempts to make artificial clear corundum a description of the modification of the Verneuil process now employed for manufacture of synthetic corundum in England. Crystallographic features reviewed. It has been found that the optic axis lies in or very close to the p along which the boule splits, but it is not coincident with the axis of the b and may make any angle from 0° to 90° with the latter. Boules of 300 carats formed in 4–5 hours. [M.A. **8**–269; **9**–51.] W. C.

Henderson (E. P.). *A cat's-eye emerald.* Gems & Gemology, Los Ang California, 1945, vol. 5, p. 202.

A cabochon-cut emerald weighing 4·65 carats in the United States Nati Museum shows a sharply defined chatoyant band. L. J.

Henderson (E. P.). *Black star spinel.* Gems & Gemology, Los Angeles, fornia, 1944, vol. 4, pp. 150–153, 3 figs.

A cabochon-cut spinel, 8·35 carats, sp. gr. 3·665, shows on the crown a 6-r star and around the girdle six 6-rayed stars with in between six 4-rayed s corresponding respectively to the triad and tetrad axes. A section parallel t octahedral face at the base shows acicular inclusions at 60°. An X-ray po photograph identifies the material as spinel. [M.A. **7**–126.] L. J.

Chayes (Felix). *Occurrence of chrysoberyl at Wakefield, Carroll County, New Ha shire.* Amer. Min., 1944, vol. 29, pp. 320–323.

Granular, yellow to green chrysoberyl is closely associated with beryl (whi seems to have replaced) and muscovite in a pegmatite quarry worked for fels

This is compared with the several other known occurrences of chrysoberyl in New England. L. J. S.

Wohlers (A.). *Nota sobre o crisoberilo de Santa Tereza, Espírito Santo.* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1941, no. 21 (Mineralogia no. 4), pp. 39–43. (Portuguese with English summary.)

An untwinned crystal of emerald-green chrysoberyl from pegmatite, measuring 8·4 × 6·8 mm., sp. gr. 3·79, shows eight crystal-forms and gave $a : b : c =$ 0·4720 : 1 : 0·5821. L. J. S.

Silva (J. P.). *Nota sobre o topazio de Arassuaí, Minas Gerais.* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1939, no. 18 (Mineralogia no. 3), pp. 59–65, 1 fig. (Portuguese with Latin summary.)

A clear, bluish-green, prismatic (4·8 cm. long) crystal of topaz from pegmatite showed 12 crystal-forms and gave $a : b : c =$ 0·52854 : 1 : 0·95423. Mention is made of other Brazilian occurrences of topaz. L. J. S.

Coutinho (J. Moacyr Viana). *Sôbre um topázio de Arassuaí (Minas Gerais).* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1945, no. 49 (Mineralogia no. 7), pp. 79–82, 3 figs. (Portuguese with English summary.)

A colourless crystal of topaz with a slight bluish tinge weighs 12½ kg. and measures 23·5 × 18·1 cm. It came from pegmatite and shows eight crystal-forms. Surface markings are described. L. J. S.

Saldanha (R.). *Sobre o euclasio de D. Bosco (município de Ouro Preto).* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1939, no. 18 (Mineralogia no. 3), pp. 29–43, 7 figs. (Portuguese with Latin summary.)

At Dom Bosco (formerly Hargreaves) euclase is found in fissures with quartz and kaolin. The crystals, up to 10 cm. long, are colourless, yellow, or greenish-blue. Goniometric measurement of ten crystals showed 47 crystal-forms of which the following are given as new: (3.14.0) ?, (4.21.0) ?, (0.7.10) ?, (083), (0.16.5), (131) [Min. Mag. **23**–620], (313) ?, ($\bar{2}$32), ($\bar{4}$14), ($\bar{5}$85), ($\bar{5}$95), (3.10.3), (375), and ($\bar{1}$.19.9). [$a : b : c =$ 0·3237 : 1 : 0·3332, β 79° 44′.] L. J. S.

Saldanha (R.). *Nota sobre o euclásio de Cachoeiro de Santa Leopoldina (estado do Esp. Santo).* Bol. Fac. Fil. Ciênc. Let. Univ. São Paulo, 1941, no. 21 (Mineralogia no. 4), pp. 25–31, 1 fig. (Portuguese with English summary.)

A colourless crystal of euclase of prismatic habit (26·5 × 20·2 mm.) from pegmatite shows 35 crystal-forms of which the following are new: (11.12.0) ?, (7.26.0), (9.37.0), (10.43.0), (0.11.2) ?, (0.11.3), (0.19.5), (0.33.16), (171), (4.21.4). [$a : b : c$ = 0·3237 : 1 : 0·3332, β 79° 44′.] L. J. S.

Scorza (Evaristo Penna). *Kunzita e hiddenita de Curieté, município de Conselheiro Penna, Minas Gerais.* Mineração e Metalurgia, Rio de Janeiro, 1944, vol. 7, pp. 333–334, 5 figs.

These gem varieties of spodumene were found, together with tourmaline and zircon, in weathered debris overlying gneiss intersected by pegmatite. The deposit was discovered in 1933 and in that year about 20 kg. of material was collected. L. J. S.

Pearl (Richard M.). *Composition of Colorado turquoise.* Gemmologist, Lond 1945, vol. 14, pp. 62–64.

Repetition of previous articles [M.A. **8**–123, 270] with nine chemical anal P_2O_5 29·95–34·61, Al_2O_3 34·49–40·32, Fe_2O_3 0·72–3·55, FeO 0·07–2·45, CuO 4· 8·64, SiO_2 0·19–1·36, H_2O+ 15·08–19·36, H_2O- 1·05–5·67, sp. gr. 2·63–2·81. L. J. S

Beliakov (M. F.). *Lazulite from a quartz vein in the region of Mount Sur in the near-polar Urals.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1 vol. 47, pp. 124–126.

Irregular accumulations of granular sky-blue lazulite occur with seri haematite, and rock-crystal [M.A. **7**–44, 212, 557; **9**–129] in quartz veins trav ing sericite-quartz-schists. Sp. gr. 3·04, H. 5–5½, α 1·616, γ 1·634; analysis g P_2O_5 46·38, Al_2O_3 32·99, FeO 2·08, MgO 12·54, CaO nil, H_2O+ 6·05, H_2 0·27 = 100·31. Some grains are of gem quality. L. J. W

Ruff (Elsie). *Jade of the Maori.* Journ. Gemmology, *in* Watchmaker, Jew & Silversmith, London, 1944, vol. 70, pp. 379–381, 439–443, 559–561, 6 621, 6 figs.; 1945, vol. 71, pp. 22–23, 139–140, 199–200, 248–250, 319– 2 figs.

A series of nine articles on the nephrite of New Zealand, dealing with occurre working and carving, general characteristics, &c. New determinations, mostl worked specimens, gave sp. gr. 2·902–3·024, H. 5½–7, *n* 1·60–1·65. Fur determinations (12) of sp. gr. of nephrite by R. Webster (ibid., 1945, vol. p. 503) gave 2·953–3·018. [M.A. **6**–501.] L. J. W

Slavík (F.). *Poznámky o podkrkonošských jaspisech a podobných hmo křemenných.* [Notes on the jaspers and similar quartz substances from foot-hills of the Giant Mountains.] Věstník Královské České Společn Nauk, 1942, for 1941, no. 16, 20 pp., 10 pls.

The semi-precious stones of NE. Bohemia occur in amygdaloidal melaph of Permian age. That the jaspers are not of contact-metamorphic origin is sh by the very common occurrence of transitional varieties of jaspagates, and by fact that at some localities typical jaspers fill veinlets in the melaphyres. Permian sediments, principally in limestones at Stará Paka, Nová Paka, Holenice, carnelians and flint-like varieties form concretions, probably of genetic origin. In the jaspers and agates the quartz substance is spheru chalcedony or pseudochalcedonite and fine-grained quartz (often 'isotr quartz'). In the concretions occurring in the sedimentary rocks the 'qu (frequently also 'isotropic') is associated with spherulitic quartzine and s opal. The cacholongs consist of typical chalcedony. The colouring materials haematite, limonite, goethite, and a chloritic mineral, often in dendritic fo Calcite and dolomite are common associates; pseudomorphs of quartz and cha dony after fibrous calcite are also present. In tuffs, tuffites, and psamn sediments the same quartz substances (chalcedony, pseudochalcedonite, opal, granular quartz) are associated with helminthic chlorites and ferric minera the same development as in the jaspers, proving their genetic identity with quartz substances in the melaphyres. F.

WAITE (G. G.). *Notes on Canadian gems and ornamental stones.* Univ. Toronto Studies, Geol. Ser., 1945, no. 49, pp. 75–78.

Localities (some new or little known) and notes on the size and quality of cut tones: agate, amethyst, andalusite, apatite, aquamarine (Kearney, Butt township, Nipissing district, Ontario), aventurine felspar (Drag lake, Dudley township, Haliburton county, Ontario), carnelian, cordierite, diopside, idocrase, peridot Timothy mt., Lake LaHache, British Columbia), peristerite (Sundridge, Strong ownship, Parry Sound district, Ontario), prehnite, rose quartz, sapphire, scapolite (Khartum, Griffith township, Renfrew county, Ontario), sodalite, thomsonite, tourmaline and tremolite (Wilberforce, Monmouth township, Haliburton ounty, Ontario), zinc-blende, zircon. M. A. P.

OUGH (Frederick H.). *Today's facts about Brazil gems—a report to U.S. Jewelers.* Jewelers' Circular-Keystone, New York, 1944, reprint 12 pp., 4 figs.

Details are given of the occurrences, mainly in pegmatites, of the gemstones eryl, topaz, tourmaline, amethyst, and, of less importance, chrysoberyl, andalusite, spodumene, and scapolite, with the conditions of working and statement of rices. The stones are now cut in Brazil, and the prospects of the industry are iscussed. Changes in colour are induced by heating the stones, both before and fter cutting. L. J. S.

'ALMGREN (John). *Bernstein in der vulkanischen Asche der Moler-Formation Jütlands.* Bull. Geol. Inst. Univ. Upsala, 1941, vol. 23, pp. 1–2, 1 fig.

A small (8 mm.) fragment of amber was found embedded in volcanic ash in ement-stone of Eocene age from Limfjord, Denmark. L. J. S.

[ACKIN (J. Hoover) & COOMBS (Howard A.). *An occurrence of "cave pearls" in a mine in Idaho.* Journ. Geol. Chicago, 1945, vol. 53, pp. 58–65, 10 figs.

Pisolites up to 13 mm. diameter were found in small $CaCO_3$-lined pools on the ibble of an adit opened in 1901 and abandoned in 1908 in the Iron Mountain istrict, SW. Idaho, where the country-rock is metamorphic limestone. They ontain a nucleus of various minerals (garnet, epidote, calcite, &c.) surrounded y concentric layers of $CaCO_3$ from a fraction of a millimetre to 5 mm. thick, the ery fine layers usually consisting of aragonite and the thicker, coarsely crystalne layers of calcite. Agitation by water dripping from the roof has caused them o be highly polished. L. J. S.

Colour of Minerals

ELANKHOLIN (N. M.) Меланхолин (Н. М.). Об окраске магнезиально-железистых слюд.—*On colouring of magnesial-ferruginous mica.* Труды Лаб. Крист. Акад. Наук СССР (Trav. Lab. Crist. Acad. Sci. URSS), 1940, no. 2, pp. 61–72, 19 figs. (English summary, p. 72.)

Absorption curves (λ 6800–4300 Å.) of several phlogopites and biotites, mpared with those of $FeSO_4$, epidote, and carnallite, point to Fe_2O_3 as the louring matter. The influence of FeO is shown only in the red region of the ectrum. Variations shown by some phlogopites are attributed to titanium. L. J. S.

Vedeneeva (N. E.) Веденеева (Н. Е.). О природной и искусствен дымчатой окраске кварца.—*On natural and artificial color of smoky-qu* Труды Лаб. Крист. Акад. Наук СССР (Trav. Lab. Crist. Acad. URSS), 1940, no. 2, pp. 87–106, 6 figs. (English summary, pp. 105–106.)

Smoky quartz of different genetic types (from pegmatites, Alpine veins, hy thermal veins, and quartz-porphyries) was examined for absorption of ordinary and extraordinary rays in the direction of greatest dichroism ($\perp$ o axis) over the range λ 6400–4400 Å. The absorption curve for the ordinary is the same in all cases, and also after the material has been partly decolo by heating; but the curves for the extraordinary ray show variations. The intense dichroism is at 4000 and 3000 Å., the latter in the ultra-violet. absorption curve of the fused quartz approaches that of amethyst and of g coloured violet by radium. The coloration is attributed to lattice distortio to the presence of foreign atoms, or to disturbance of electrons by radiation.

L. J. S

Vedeneeva (N. E.) Веденеева (Н. Е.). К вопросу о природе окра аметиста.—*On the nature of coloring of amethyst.* Труды Лаб. Крист. А Наук СССР (Trav. Lab. Crist. Acad. Sci. URSS), 1940, no. 2, pp. 107– 3 figs. (English summary, pp. 109–110.)

Absorption curves (λ 6400–4400 Å.) for the ordinary and extraordinary in amethyst from Brazil are approximately parallel, each with the maximu 5400 Å., and are similar to the curve for glass coloured violet by radium. Dichro does not conform with the optical indicatrix, the greatest effect being seen direction not perpendicular to the optic axis, and is of the type shown by colo cellophane. The colour is due to highly dispersed inclusions, it is suggeste Fe‴ ions, the charge of which is neutralized by radioactive rays. L. J.

[Lemmlein (G. G.)] Леммлейн (Г. Г.). Окрашенные ореолы вокруг включе монацита в кварце. Доклады Акад. Наук СССР, 1944, vol. 45, pp. 274, 1 fig.

Laemmlein (G. G.). *Coloured haloes around monazite inclusions in quartz.* Co Rend. (Doklady) Acad. Sci. URSS, 1944, vol. 45, pp. 255–257, 1 fig.

Laemmlein (George G.). *Coloured haloes surrounding inclusions of monazit quartz.* Nature, London, 1945, vol. 155, pp. 724–725, 2 figs.

Smoky quartz from Antonova Gora mine, Transbaikal, shows spherical s 0·5–6 mm. diameter, with a crystal or cluster of crystals of monazite (0·1–1 diam.) in the centre. The size of the spots is proportional to the size of the nu and the colour is darker near the centre, fading away gradually to an indis periphery. These 'β-haloes' are due to the action of hard β-rays, and are dis from the concentric 'α-haloes' due to α-rays. Similar haloes were also obse around orthite enclosures in quartz from Volhynia pegmatite. L. J.

Mateos (Josefina Pérez). *El color en la turmalina.* Notas y Comunic. Geol. y Minero de España, 1944, no. 13, pp. 217–289, 2 pls.

Chemical analyses of tourmaline from the literature are tabulated acco to colour. Spectrographic analysis showed the presence of 22 elements: Si, B, Be, Fe, Mn, Mg, Na, K, Pb (suggested to be of radioactive origin), and C

l the 26 specimens examined from various localities; Cr, Co, Ca, and Ti in most them; V in eleven; Sc and Sn together in seven; and Ni, Sb, Ag in one each; only in those of red, blue, or green colour. With more Fe and Mg the colour is ack, with less it is green. Blue patches and zones are present in black and brown urmaline. The dichroic colours of each specimen are stated. A specimen belled as achroite from Elba is identified as clinozoisite. L. J. S.

EYL (Waldemar A.). *Coloured glasses. Part I. The constitution of coloured glasses.* Journ. Soc. Glass Techn., 1943, vol. 27, pp. 133–206, 12 figs.

— *Part II. The colour of glasses produced by various colouring ions.* Ibid., 1943, vol. 27, pp. 265–295, 8 figs.; 1944, vol. 28, pp. 158–266, 45 figs.

— *Part III. The colours imparted by the non-metallic elements: sulphur, selenium, tellurium, and phosphorus and their compounds.* Ibid., 1944, vol. 28, pp. 267–354, 16 figs.

A detailed monograph. [M.A. 8–265.] L. J. S.

EUMANN (Henrich) & ROSENQUIST (Ivan Th.). *On red fluorescent calcite from the Fen area near Ulefoss.* Norsk Geol. Tidsskrift, 1941, vol. 20 (for 1940), pp. 267–268.

Calcite crystals, occurring with dark violet fluorite in a calcite vein in vibetoite, e mostly white, but some show irregular red patches. In the ultra-violet the d portions show a bright yellow fluorescence; the white portions none. Both rtions contain Fe and Mn (no rare-earths), and the fluorescence is probably due organic matter. The residue, after dissolving the crystals in HCl, taken up ith ether and acetic acid gave a red solution which showed a fluorescence.

L. J. S.

ÉRIBÉRÉ (Maurice). *Les minéraux luminescents: l'aragonite Girgenti.* Ann. Soc. Géol. Belgique, 1942, vol. 65 (for 1941–42), Bull. pp. B272–B274.

At Girgenti aragonite occurs with calcite and native sulphur in lenticles and odes in marly limestone. In ultra-violet rays it gives a rose-red or a blue-green torescence followed by a brief green phosphorescence. Material giving the rose-d colour is in contact with and encloses orange-coloured sulphur containing 5% Se, while that giving the blue-green colour is associated with Sr as celestine d no Se. The brilliant rose-red fluorescence is attributed to CaSe. The calcite ves a bluish fluorescence. Aragonite with sulphur in marly limestone from alvezy, Aude, France, and Constantine, Algeria, gives a blue-green fluorescence.

L. J. S.

MONS (Henry H.). *Fluorescent minerals in the exhibit of the State Division of Mines.* California Journ. Mines & Geol., 1944, vol. 40, pp. 361–368.

ALSTON (Oliver C.) & STERN (A. George). *Fluorescent minerals used in lighting and elsewhere.* Ibid., pp. 369–380.

A list is given of the fluorescent minerals in the collection. For fluorescent hting artificial compounds (silicates, sulphides, and tungstates of Zn, Be, Cd, ually with Mn as an activator) are more efficient than natural minerals.

L. J. S.

Warren (Thomas S.). *List of fluorescent minerals.* Mines Magazine, Denv Colorado, 1944, vol. 34, pp. 342–343, 363.

An alphabetical list of some 100 minerals giving localities and fluores colours in short-wave ultra-violet. L. J. S

Weinberg (T. I.). *Influence of the chemical composition of uranyl glass upo photoluminescence.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1945, vol. pp. 318–321, 4 figs.

In strongly alkaline glasses UO_3 forms uranates and the glass is orange-colo and not fluorescent, while in acid glasses it forms uranyl compounds and glass is yellow-green with strong fluorescence. Glass with UO_2 is dark green a not fluorescent. In silicate and borate glasses, $R_2O.3SiO_2$ and $R_2O.3B_2O_3$, c taining 1% UO_3 (added as uranyl nitrate), the fluorescence intensity increases w the atomic radius of the alkali metal from Li to Cs. It also increases with alkalinity of the glass; $R_2O.9B_2O_3$ gave an efficiency of nearly 100%. In r with alkaline earths fluorescence is less and decreases from Ca to Ba. Phosph glasses give low values. Impurities, especially iron, have a deleterious effe Commercial glasses for screens and lamps with a fluorescent yield of 50–60% ha been produced. L. J. S

Topographical Mineralogy

Bjørlykke (Harald). *Feltspat V. De sjeldne mineraler på de norske granitt pegmatittganger.* Norges Geol. Undersök., 1939, no. 154, 78 pp., 6 f (English summary, pp. 77–78.)

Previous memoirs in this series on the felspar resources of Norway appea in 1926, 1931, and 1934 [M.A. **6**–231]. The present number gives an account 27 rarer minerals containing U, Th, Nb, Ta, Be, Zr, Hf, Li, Rb, Cs. A detai list of localities is given for each mineral, and a topographical index is append All published chemical analyses of the minerals are tabulated. According to paragenesis of these minerals granite-pegmatites poor in calcium are divided i the following types: thalenite-gadolinite, fergusonite, euxenite (samarskite), a columbite; and pegmatites rich in calcium into the hellandite-gadolinite, fer sonite-betafite, and betafite types. L. J. S

Neumann (Henrich). *Silver deposits at Kongsberg. (The mineral assemblage native silver-cobalt-nickel ore type.)* Norges Geol. Undersök., 1944, no. 1 133 pp., 8 pls., 48 text-figs.

The narrow veins in dioritic and granitic gneisses contain an earlier 'pa genesis of minerals (anthracite 'coal-blende', fluorite, axinite, pyrite), a later (calcite, baryte, fluorite, sulphides, native silver, Ni–Co arsenides), and fina (calcite, zeolites), which were deposited at temperatures 500–200° C. and 1 atmospheres pressure. Calcite is the predominating gangue mineral. Detai descriptions, partly from the literature (bibliography of 83 entries), with m new data, are given of some 50 species of minerals, of which anatase, dato (α 1·622, β 1·649, γ 1·666, sp. gr. 2·997), armenite [M.A. **7**–468; **9**–188], stellerite are new for the locality. The Ni–Co minerals (rammelsbergite, safflor chloanthite-smaltite) are in only small amount. Axinite, sp. gr. 3·299, α 1·6

1·684, γ 1·689, 2V 76°, negative (the optical orientation is plotted), gave nalysis SiO_2 42·40, B_2O_3 6·05, Al_2O_3 18·22, Fe_2O_3 0·53, FeO 5·83, MnO 4·42, gO 0·83, CaO 19·72, Na_2O 0·14, K_2O 0·03, H_2O+ 1·60 = 99·77. Published nalyses are plotted on a triangular diagram Fe-, Mn-, Mg-axinite. Stellerite M.A. **3**–28, **4**–325; Min. Mag. **25**–271] is found in several of the mines as laminated nasses parallel to the perfect cleavage (010); sp. gr. 2·127, α 1·482, γ 1·493, 2V 49°, egative, SiO_2 59·23, Al_2O_3 15·04, Fe_2O_3 0·05, CaO 7·96, Na_2O 0·31, H_2O 17·94 = 0·53; other material gave α 1·484, γ 1·495, α 1·487. L. J. S.

DMAN (Olof H.). *Minerals of the Varuträsk pegmatite. XXXIII. Native elements and sulphides.* Geol. För. Förh. Stockholm, 1942, vol. 64, pp. 277–282, 2 figs. [Nos. XXVII–XXXII, M.A. **8**–353, 354.]

Minerals previously mentioned are allemontite [M.A. **6**–487, **8**–98], antimony M.A. **7**–121], and stibnite [M.A. **8**–353]. Bismuth, pyrrhotine, and chalcopyrite ave been found only microscopically in polished sections. Analyses by T. Berg- ren of löllingite (As 68·58, S 1·64, Fe 28·78, Bi< 0·01, Ag< 0·01, insol. 1·00, otal '99·96', sp. gr. 7·071), antimony-bearing mispickel (As 46·52, S 18·09, 'e 33·72, Sb 1·44, total 99·77), and an intergrowth of pyrite, mispickel, gudmun- ite (?), and an unknown mineral (Sb 8·90%, &c.). L. J. S.

UENSEL (Percy). *Minerals of the Varuträsk pegmatite. XXXIV. Quartz in different structural and paragenetical modes of occurrence within the Varuträsk pegmatite.* Geol. För. Förh. Stockholm, 1942, vol. 64, pp. 283–288, 3 figs.

Cavities are very rare in this pegmatite, and only one small vug of quartz rystals has been found. Clear glassy quartz, colourless or smoky, belongs to the leavelandite phase with lepidolite, coloured tourmalines, and manganapatite, nd is α-quartz formed below 573° (probably down to about 400°). Milky uartz associated with microcline-perthite, petalite, and pollucite is β- or high- emperature quartz, and shows strain structure between crossed nicols.

L. J. S.

UENSEL (Percy), with analyses by BERGGREN (Thelma). *Minerals of the Varuträsk pegmatite. XXXV. Stibiomicrolite. (Species redefined).* Geol. För. Förh. Stockholm, 1945, vol. 67, pp. 15–27, 3 figs.

Rounded black crystals (up to 2 cm.), from a new find in 1943, consist of colour- ess to light yellowish-brown material darkened by specks and films of metallic ntimony, and with remnants of stibiotantalite. Analysis gave Ta_2O_5 71·94, Nb_2O_5 8·45, Sb_2O_3 1·40, SiO_2 0·95, Al_2O_3(+Ce,U) 0·27, Fe_2O_3 0·03, MnO 0·16, SrO 0·08, CaO 11·38, Na_2O 5·04, K_2O 0·19, H_2O+ 0·42 = 100·31. Sp. gr. 5·619, sotropic, a 10·40 Å. This antimony-bearing microlite is an alteration product of stibiotantalite and not of a hypothetical mineral to which the name stibiomicrolite was previously applied. Other analysed crystals of similar appearance, consisting of a mixture of stibiomicrolite (a 10·41 Å.), manganotantalite (a 5·09, b 14·39, 5·76 Å.), stibiotantalite (a 4·92, b 5·54, c 11·78 Å.), and metallic antimony, have resulted from the alteration of a mixture of stibiotantalite and manganotantalite. [M.A. **7**–121; **8**–99, 353.] L. J. S.

Bøggild (O. B.). *Danmarks mineraler.* Danmarks Geol. Unders., 1943, ser. no. 71, 68 pp., 21 figs. (English summary, pp. 60–67.) Price 3 Kr.

'Minerals in Denmark are neither very numerous nor conspicuous'; and t would be fewer still if those from granite and pegmatite in the small outcro pre-Cambrian rocks on the outlying island of Bornholm were omitted. Colle accounts are given of 50 species, with mention of a few others from the literat of which the identification is doubtful. A list is given of the minerals occur in each geological formation, Quaternary to pre-Cambrian, but there is no in of localities. L. J. S.

Munck (Sole) & Noe-Nygaard (Arne). *Chemical analyses of igneous and m morphic rocks of Denmark, the Faeroes and Greenland. (To and including 19* Danmarks Geol. Unders., 1942, ser. 2, no. 68, 105 pp., 6 figs. (maps). (Da summary, p. 43.) Price 4 Kr.

A collection of 260 chemical analyses with brief petrographical descript from the literature. Under each region analyses are arranged in the orde silica percentage. The majority (181) are of rocks from Greenland. In additi 38 analyses of telluric iron and 4 of meteoritic irons from Greenland are tabula Localities are marked on maps and indexed. L. J. S.

Lokka (Lauri). *Beiträge zur Kenntnis des Chemismus der finnischen Mineral Glimmer, Pyroxene, Granate, Epidote, u. a. Silikatminerale sowie mei kowitähnliches Produkt und Shungit.* Bull. Comm. Géol. Finlande, 19 no. 129, 72 pp.

Many detailed chemical analyses, with specific gravity but no optical data, a given of the following minerals from various localities in Finland: muscovi biotite, lepidomelane, phlogopite, fayalite, chlorite, thulite, scapolite, diopsid hedenbergite, iron-rich diopside, chrome-diopside, hypersthene, hornblend spinel, grossular, spessartine, andradite, black epidote, tourmaline. Dehydrati data and analyses of the portions soluble in HCl and in NaOH are given for t micas. A 'natrophilite-like mineral' from Skogsböle, Kimito, gave P_2O_5 42·3 Fe_2O_3 2·35, FeO 23·66, MnO 17·83, MgO 0·48, CaO 1·74, Na_2O 8·79, K_2O 0·5 Li_2O trace, SiO_2 0·31, F 0·29, H_2O+ 1·27, H_2O- 0·21 = 99·82, sp. gr. 3·55 A 'hydrous melnikovite-like mineral' occurring as black nodules in the pyri deposit at Otravaara gave S 51·49, Fe 39·52, SiO_2 1·36, H_2O 7·95=100·32, sp. 3·523; S/Fe = 2·27, all the water is lost at 100°; water extracts Fe 6·43, S 4·37 (S/Fe 1·18), leaving Fe 33·29, S 47·44 (S/Fe 2·48) which is a mixture of melnikovi and gel pyrite. Eleven analyses of shungite from Shunga, Lake Onega, and oth localities in eastern Karelia show C 46–99, ash 1–46, V_2O_5 0·016–0·77%, & sp. gr. 1·8–2·186. L. J. S.

Pehrman (Gunnar). *Die Granitpegmatite von Kimito (S.W.-Finnland) und il Minerale.* Acta Acad. Aboensis, Math. Phys., 1945, vol. 15, no. 2, 84 p 21 figs.

A collected account is given of about 30 minerals, with some new optical a other data, from the several lenticular intrusions of pegmatite, together with geological map and description of the rocks. Chemical analyses are given graphic granite, and the orientation of the quartz is noted. Cassiterite, sp. g

015, ω 2·002, gave SnO_2 96·18, Ta_2O_5 3·26, Nb_2O_5 0·04%, &c. The author's emnäsite' (M.A. 7–418] is now referred to alluaudite, and a 'natrophilite-like ineral' analysed by L. Lokka [preceding abstract] to arrojadite. Analysis I of uscovite by R. Birck and S. Henriksson; II, lepidolite by T. Berggren and Henriksson; III, montebrasite by A. Ringbom.

	SiO_2.	TiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	MgO.	CaO.	Li_2O.	Na_2O.	K_2O.	Rb_2O.
.	43·65	0·14	32·54	2·62	1·63	—	1·06	—	0·46	1·05	8·92	0·53
.	48·94	0·00	22·21	1·55	1·52	0·75	0·03	0·10	4·99	0·53	8·62	3·8
.	0·40	—	33·87	0·13	—	0·02	0·33	0·53	8·85	0·83	0·18	—

	Cs_2O.	F.	H_2O+.	H_2O-.	Total.	Sp. gr.	α.	β.	γ.	2V.
.	<0·2	1·00	3·85	2·48	100·13	2·635	—	1·586	1·590	42° 8′
.	1·08	6·69	1·46	0·88	103·15	2·866	—	1·585	1·587	41° 43′—42° 1′
.	—	0·57	5·84	0·15	99·73	3·002	1·611	1·619	1·633	73° 22′

[A. **3**–152; **5**–383; **7**–417.] L. J. S.

OGINOV (V. P.) Логинов (В. П.). Реликтовые гипогенные минералы в боковых породах Кабанского колчеданного месторождения.—*Hypogenetic relicts minerals in the wall rock of the Kabanskoye pyrite deposite (the middle Urals)*. Изв. Акад. Наук СССР, Сер. Геол. (Bull. Acad. Sci. URSS, Sér. Géol.), 1944, no. 5, pp. 106–112. (Russian with English summary.)

The following minerals have been discovered in the secondary quartzites and hists of Kaban, near Kushva, Urals: zunyite (first discovery in the Urals), rundum, fluorite; together with diaspore, chloritoid, pyrophyllite, rutile, topaz, d baryte, which were already described. These minerals are found disseminated the rocks or concentrated in the form of alumina-rich segregations, three emical analyses of which are given. S. I. T.

OBINSON (A. J.). Bull. Soc. Jersiaise, 1939, vol. 13, pp. 353–355, 1 fig.

In the report of the Geological Section of the Society for 1938 a find of stalactitic aterial identified as allophane is recorded from the east cliff of La Cotte de . Brelade, Jersey. Analysis gave SiO_2 24·5, Al_2O_3 41·5, Fe_2O_3 1·1, H_2O &c. by ff. 32·9%. A Baveno-twin of orthoclase from a pegmatite at Gigoulande is gured. W. C. S.

AVÍK (F.). *Nerostopis a ložiska užitkových minerálů Slovenska.* [Mineralogy and deposits of economic minerals of Slovakia.] Carpatica III, no. 2, Praha, 1939, 62 pp., 8 pls., 8 text-figs. (Czech with French résumé.)

A survey of mineral occurrences arranged according to mineralogenetic units, ith data on mineral exploitation since 1936. An account is given of the Dubník cality for precious opal. Illustrated by photographs and maps of the mining stricts, Kremnica and Štiavnica [= Schemnitz], in the Slovakian Ore Mountains. F. S.

JČEK (Karel) & NOVÁČEK (Radim) [1905–42]. *Naše nerosty, jejich sběr a určování.* [Our minerals, their collecting and determination.] Praha (Vesmír Publishing Co.), 1941, 200 pp., 72 figs.

A very useful popular book for mineral collectors, with chapters on collecting inerals in the field and their determination by external characters and chemical

tests. Information is given on mineralogical museums and private collection Czechoslovakia. F. S

Tučeк (Karel). *Nové nálezy nerostů I.* (*Příspěvky k topografické mineralogi Neue Vorkommen von Mineralien I.* (*Beiträge zur topographischen Mi logie.*) Věstník Králov. České Spol. Nauk, Třída Mat.-Přír. [Mém. Roy. Sci. Bohême, Cl. Sci.], 1944, for 1943, no. 16, 32 pp., 8 figs. (Ger summary, pp. 24–31.)

Brief descriptions of a number of Bohemian minerals in the collectio the National Museum from localities not previously recorded, grouped u the headings ore-deposits, metamorphic, igneous, and sedimentary rocks. L. J. S

Rost (Rudolf). *O českých copiapitech.—Von böhmischen Copiapiten.* Sbo Národního Musea, Praha, 1940, vol. 2, pp. 215–223, 1 pl., 2 text-figs. (W German abstract.)

Copiapite recently found in the Tmavýdůl coal mine near Rtyně, NE. Bohe shows monoclinic crystals tabular on (010), α 1·527, β 1·53–1·54, γ 1·58, α $\beta : c = 38\frac{1}{2}°$; analysis gave SO_3 40·03, Al_2O_3 4·04, Fe_2O_3 24·00, FeO 0·90, MgO $(Na,K)_2O$ 0·30, NH_3 trace, H_2O 30·52 = 100·23, with the ratios $Fe_2O_3 : S$ H_2O = 1·9 : 5·0 : 16·4. Dehydration, 12·36 at 105°, 16·38 at 125°, 20·82 at 14 22·89 at 168°, 24·72% at 208°. The material is hygroscopic and changes on surface to coquimbite (ω 1·540, ϵ 1·544). Römerite rarely occurs with copiapite; it is reddish-brown with rose to brownish-rose pleochroism, α 1·5 β 1·567, γ 1·580, extinction 20–39° to the cleavage. A mineral from the alum a pyritous shales of western Bohemia described by F. Slavík (1904) as ihleite proved to be copiapite. F. S

Rost (Rudolf). *O totožnosti Klvaňova paracoquimbitu se slavíkitem.* [On identity of Klvaňa's paracoquimbite with slavíkite.] Rozpravy České Aka 1941, vol. 51, no. 8, 6 pp.

The paracoquimbite of J. Klvaňa (1882) [Min. Mag. **19**–346] from Troja, no of Praha, was incompletely described. Deducting from his analysis MgO and C as epsomite and gypsum the ratios are $Fe_2O_3 : SO_3 : H_2O$ = 1·08: 2·00 : 9·13, agree with the formula of slavíkite (following abstract). The optical data, ω 1·5 ϵ 1·496, also agree with those of slavíkite. Klvaňa's 'fibrous keramohalite' fr the same locality is pickeringite containing about 0·5% FeO. [Not the pa coquimbite of H. Ungemach, M.A. **5**–390, **6**–149.] F. S

Rost (Rudolf). *Chemické složení slavíkitu.* [Chemical composition of slavíki Rozpravy České Akad., 1940, vol. 50, no. 9, 8 pp., 2 figs. German abstrac Bull. Internat. Acad. Sci. Bohême, 1940, vol. , pp.

Four new localities for slavíkite are recorded from the region of Jílové, so of Praha, with associated gypsum, pickeringite, epsomite, and halotrich Analysis I from Luka, II and III from Jarov. Alkalis are due to admixed nat jarosite; CaO, MgO, and FeO to gypsum, epsomite, and halotrichite. Up to 2

oss of H_2O 32%. Formula, $Fe_2O_3.2SO_3.9H_2O$. [M.A. **3**–365, **5**–188, **7**–464, 3–187.]

	SO_3.	Al_2O_3.	Fe_2O_3.	FeO.	MnO.	MgO.	CaO.	Na_2O.	K_2O.	H_2O.	Total.
I.	34·70	2·79	19·08	0·00	trace	4·40	0·42	0·68	0·26	36·65	98·98
II.	34·61	1·77	18·75	0·82	„	4·54	2·38	0·28	0·13	36·58	99·86
III.	34·23	3·52	16·94	0·65	„	4·63	0·87	0·53	0·16	38·46	99·99

F. S.

Rost (Rudolf). *Mineralogické zprávy z Kladenska.* [Mineralogical notes from the Kladno region.] Rozpravy České Akad., 1942, vol. 52, no. 26, 8 pp.

Tetrahedrite is noted amongst the sulphide minerals in the veinlets in the underlying Carboniferous rocks. Paragenetic and topographic details are given for baryte, whewellite, stibnite, and marcasite. Linnaeite is proved to be present in the claystones of the coal measures. The secondary mineral that has been described as aluminite from the overlying Cretaceous sediments is a metacolloidal aluminium hydroxide, differing from gibbsite (n 1·57–1·59) in its low n 1·47–1·48. F. S.

Rost (Rudolf). *Minerály pegmatitových žil na Vavřinečku u Domažlic.* [Minerals of the pegmatite veins on the Vavřinec hill near Domažlice, Bohemia.] Věda Přírodní, Praha, 1943, vol. 21, pp. 278–283, 4 figs.

Accessory minerals are: zircon (prismatic crystals *a m o x*), wolframite (lamellar), garnet, vivianite (earthy), and a phosphate of the triplite group with n 1·702–1·722, perhaps an isomorphous mixture of triplite and triploidite as suggested by the following data made for comparison. Triplite from Slavkov (= Schlaggenwald), Bohemia, n 1·672–1·683; from Víden, Moravia, n 1·702–1·717. Triploidite from Hagendorf, Bavaria, n 1·683–1·702. F. S.

Kašpar (Jan Václav) & Kunský (Josef). *Geysírove krápníky ze Zbrašovských aragonitových jeskyň na severní Moravě.* [Geyser stalagmites from the aragonite caves at Zbrašov, northern Moravia.] Rozpravy České Akad., 1942, vol. 52, no. 29, 10 pp., 3 pls., 4 text-figs.

In the Zbrašov caves, near Hranice, hollow cones are rather frequent, and similar to the geyser dams of the Yellowstone National Park, U.S.A. described by E. T. Allen and A. L. Day (1935). The succession of deposition in the caves is limonite—wad—calcite (often in repeated layers). F. S.

Kašpar (Jan Václav). *Axinitové žíly ze Záběhlic u Zbraslavě.* [Axinite veins of Záběhlice near Zbraslav, Bohemia.] Rozpravy České Akad., 1942, vol. 52, no. 13, 4 pp., 1 pl., 1 text-fig.

Veins, up to 12 cm. thick, in Algonkian schists and spilites contain lamellar axinite and crystals (110), ($1\bar{1}0$), ($1\bar{1}1$), with associated quartz and calcite. The fresh axinite is pale violet, changing on exposure to greyish-violet and afterwards to brownish-green. Analysis gave SiO_2 40·12, B_2O_3 5·87, Al_2O_3 17·96, Fe_2O_3 4·88, FeO 4·75, MnO 0·81, MgO 1·49, CaO 20·14, Na_2O 2·12, H_2O+ 2·45, H_2O- 0·16 = 100·75, and spectroscopic traces of Sr; the content of Mn is lower than usual and of Na higher. Sp. gr. 3·244–3·254. Some of the crystals are pseudomorphosed to a chloritic mineral. F. S.

Nováček (Radim) [1905–42]. *Bertrandit z Domažlicka.* [Bertrandite fro Domažlice.] Časopis Národního Musea, Praha, 1940, vol. 114, pp. 215–2 2 figs.

The only specimen of bertrandite from this new locality in Bohemia sho crystals on corroded beryl with muscovite and quartz. Forms *a b c*, *g* (30 *f* (101), η (021), *d* (043), and uncertain (065), (035) [$a : b : c = 0{\cdot}7191 : 1 : 0{\cdot}420$ Some of the crystals are twinned on (041). F. S

Kratochvíl (František). *Několik nových nálezů.* [Some new mineral find Časposis Národního Musea, Praha, 1939, vol. 113, pp. 129–131, 1 fig.

Large aggregates of andalusite in the granite-pegmatite of Dolní Bory, west Moravia, are known to enclose sapphire and green monzaite [M.A. **4**–42, **5**–48 The author now finds crystals of columbite which are sometimes surrounc by red haloes in the andalusite. The red colour may perhaps be due to N and Ta. F. S.

Kuthan (Miroslav). *O rtuťové ložiská Slovenska. I.* [Mercury deposits Slovakia.] Práce Štátneho Geol. Ústavu, Bratislava, 1941, no. 2, 45 p 2 maps, 6 text-figs. *II.* 1941, no 4, 56 pp., 8 pls., 12 text-figs. *III.* 19 no. 7, 64 pp., 2 pls., 12 text-figs.

I. On Zenderling hill, SW. of Gelnica, sericitized porphyroids are penetrate by veins in which schwazite (mercurial tetrahedrite) replaces chalybite an pyrite and itself is replaced by cinnabar; associated minerals are quartz an baryte. In the well-known precious opal region of Dubník propylitized andesite contain cinnabar and stibnite.

II. At Merník near Vranov, NE. of Košice, cinnabar veins in Miocene congl merate and in pitchstone are due to eruptions of rhyodacite. The succession i the veins is: quartz—calcite or dolomite—cinnabar partly replaced by meta cinnabarite—chalcedony. Locally the veins contain pyrite and marcasite Organic substances, including crystalline hatchettine, were derived from under lying Palaeogene sediments.

III. In the neighbourhood of Tajov, well known as a locality for orpiment an realgar, cinnabar and the arsenic sulphides occur in veins and metasomati impregnations in Neogene sandstones, andesitic agglomerates, and Mesozoi dolomites. The cinnabar veins are younger than those of the arsenic sulphide and show the succession: quartz—carbonates—chalcedony—cinnabar. The pr mary arsenic ore is mispickel, which is anterior to the cinnabar. F. S.

Goll (Jaroslav J.). *Metalografické studie o niklových rudách od Dobšiná.* [Metall graphic studies on the nickel ores of Dobšiná.] Rozpravy České Akad., 193 vol. 47 (for 1937), no. 3, 18 pp., 3 pls., 5 text-figs.

—— *Étude métallographique des minerais de nickel provenant des environs Dobšiná* (*Slovaquie*). Bull. Internat. Acad. Sci. Bohême, 1937, vol. 3 pp. 11–16, 3 pls., 5 text-figs.

Vein fillings and metasomatic ore-deposits of Dobšiná are of two differe paragenetic types: (1) chalybite with younger primary copper ores (not

ementation origin) and locally with nickel and cobalt ores; (2) quartz and nkerite with chalcopyrite and pyrite. Metallographic examination of the ersdorffite [M.A. **6**–428] shows a zonal structure and lack of homogeneity, and a six chemical analyses (Ni,Co,Fe) : (As,Sb,S) ranges from 3 : 4 to 1 : 2. The uter and inner parts of one crystal gave As 52·43 and 57·54, Ni 15·64 and 9·82%. Dobschauite, plessite, and amoibite, earlier described from Dobšiná, re undoubtedly also mixtures. The succession in the nickeliferous veins is: halybite I—nickel ores—chalybite II—chalcopyrite—chalybite III. F. S.

LUTINA (Jan). *Nové nálezy nerostů na Říčansku a Jílovsku.* [New mineral finds at Říčany and Jílové.] Věda Přírodní, Praha, 1944, vol. 23, pp. 33–41, 7 figs.

A large crystal of orthoclase from granite-pegmatite at Březí near Říčany (SE. f Praha), of unusual habit with predominant orthodiagonal zone, shows the orms *P* (001), *B* (501), *H* ($\bar{3}01$)?, *r* ($\bar{4}03$), *x* ($\bar{1}01$), *d* (241)?, *u* ($\bar{2}21$)?, and *o* ($\bar{1}11$). Lithia-tourmaline (indicolite and rubellite) have been found for the first time in he granite massif. F. S.

ČUČEK (Karel). *Erythrin z Bělovsi u Náchoda.* [Erythrite from Běloves near Náchod.] Rozpravy České Akad., 1943, vol. 53, no. 11, 5 pp.

Acicular and powdery erythrite has been found with cuprite, chalcosine, olomeykite, and malachite. Olivenite as felted aggregates also occurs at this ocality in Bohemia. F. S.

VAN (L.). *Výskyty travertínov na Slovensku.* [Occurrences of travertines in Slovakia.] Práce Štátneho Geol. Ústavu, Bratislava, 1943, no. 9, 72 pp., 7 pls., 9 text-figs. (Czech with German summary.)

Geological descriptions of 46 localities in which travertines of Quaternary age occur. At many places they are worked for decorative stones. [M.A. **4**–405.] F. S.

DIEHL (E.). *Beitrag zur Kenntnis der Erzfundstellen Irans.* Schweiz. Min. Petr. Mitt., 1944, vol. 24, pp. 333–371, 1 pl. (map 1 : 4,000,000).

About 200 occurrences of minerals containing Au, Pb, Zn, Cu, Sn, Hg, As, Ni, Co, Cr, Sb, Fe, Mn, or Mo are briefly described and their numbered localities marked on a map. Most of the ores are low-grade. A brief account is given of the geology of the region. L. J. S.

DUNN (J. A.). *The economic geology and mineral resources of Bihar province.* Mem. Geol. Surv. India, 1942, vol. 78, iv+238+li pp., 1 pl. (map, 1 inch = 10 miles), 2 text-figs.

Bihar (separated from Orissa in 1936) 'is easily the richest mineral province in India'. In 1939 it contributed 39·4% of the mineral wealth of the country, with half the production of coal and iron-ore and the bulk of the best quality mica. There is also a remarkable diversity in the kinds of minerals available, which are dealt with in 35 chapters ranging from abrasives to vanadium. Useful

bibliographies are given at the end of each chapter and there is a detailed locali index. L. J. S.

[Way (H. J. R.).] *Swaziland, Annual Report of the Government Geologist for year ended 31st December, 1943.* 1944, 26 pp., 3 pls., 4 text-figs., 1 ma (1 : 500,000). Price 5*s*.

This is the second report of a reconnaissance survey of the Swazil territory. It includes reports on occurrences of cassiterite, scheelite, coru dum, calcite, and fluorite. The corundum occurs between Hlatikulu a Goedgegun in a plumasite and forms roughly hexagonal barrel-shaped crys up to 6 inches long and 4 inches diameter, and these are derived from the breaki up of still larger crystals. The genesis of the corundum was discussed in the ear report (1943). The fluorite occurs near Hluti in a silicified zone in granite wh it forms veins up to 1½ feet thick. Colour varies from green or grey to purp E. D. Mountain has described interesting quartz geodes from the same locali [M.A. **9**–119]. W. C. S.

Warren (H. V.) & Thompson (R. M.). *Antimony minerals from British Columb and Yukon Territory: boulangerite, chalcostibite, jamesonite, zinckenite.* Uni Toronto Studies, Geol. Ser., 1945, no. 49, pp. 78–84.

These minerals are identified with the help of polished sections, specific gravi measurements, spectrographic analyses, X-ray powder photographs, and in son cases chemical analyses by J. R. Williams & Son. Boulangerite is found at properties, including the Sullivan mine, near Kimberley, B.C. (anal. I); Babi bonanza, Cronin creek, Omineca mining division, B.C. (II); and Lightning Pe claims, Granby river and Rendell creek, Vernon mining division, B.C. (III, al Se trace). Chalcostibite (sp. gr. 4·86) is intergrown with stibnite at Carbon hi Wheaton district, Y.T. Jamesonite is found at the St. Paul mine, Monashee m Vernon mining division (IV, after deducting some mispickel and blende). Zin kenite occurs near Bonanza creek, Tyaughton lake area, Bridge river distric B.C. (V).

	S.	Sb.	As.	Pb.	Ag.	Fe.	Total.	Sp. gr.
I.	18·40	24·95	0·71	55·35	—	0·51	99·92	6·18
II.	18·45	25·40	0·36	55·45	0·06	0·13	99·85	6·08
III.	18·50	25·50	0·24	55·40	—	0·25	99·89	6·08
IV.	19·15	35·58	—	40·73	—	4·54	100·00	5·59
V.	21·84	42·30	0·48	34·58	—	0·50	99·70	—

M. A. P.

Armstrong (H. S.). *Mineralogy of the Little Long Lac gold area, Ontario.* Am Min., 1944, vol. 29, pp. 305–319.

Description of 23 minerals (mispickel, pyrite, gold, chalcopyrite, cubani leucopyrite, scheelite, &c.) shown in polished sections from seven mines in th area in northern Ontario [M.A. **6**–229]. L. J. S.

Tomlinson (W. Harold). *Occurrence of borosilicates in diabase at Lambertvil New Jersey.* Amer. Min., 1945, vol. 30, pp. 203–204, 1 fig.

Veins of diabase-pegmatite in the finer grained diabase contain abunda axinite (up to 30% of the rock) with some datolite, prehnite, &c. L. J. S.

ORDON (Samuel G.). *The mineralogy of the tin mines of Cerro de Llallagua, Bolivia.* Proc. Acad. Nat. Sci. Philadelphia, 1944, vol. 96, pp. 279–359, 13 pls., 82 text-figs.

A collected account is given of the geology and the veins of rich tin ore, with escriptions of 64 mineral species illustrated by good drawings of crystals. New ystal-forms are given for stannite (crystals up to 4 cm., and pseudomorphs ter blende), bismuthinite (crystals up to 30 cm. long), marcasite (oriented owths on pyrrhotine and pyrite), franckeite, andorite, and wolframite; and emical analyses of pyrrhotine, wolframite, monazite, apatite, crandallite, avellite, vauxite, paravauxite, metavauxite, childrenite, hisingerite, and hosphate-allophane. [M.A. **2**–148, 187, 433; **3**–56, 370; **5**–166, 200; **7**–494, 08.] L. J. S.

ILSON (Allan F.). *A new occurrence of monazite in South Australia.* Trans. Roy. Soc. South Australia, 1943, vol. 67, p. 38, 1 fig. (map).

Brilliant honey-yellow crystals (up to 12 mm.) of monazite occur with large ystals of rutile near Strathalbyn. L. J. S.

ENDERSON (J.). *Quartz crystal in New Zealand.* New Zealand Journ. Sci., Sect. B, 1944, vol. 25, pp. 162–169.

Localities are enumerated where rock-crystal suitable for piezoelectrical use ould be searched for; the crystals so far found are too small. L. J. S.

Miscellaneous

ABER (Harald). *On the salt-solutions in microscopic cavities in granites.* Danmarks Geol. Unters., 1941, ser. 2, no. 67, 45 pp., 2 figs. Price 2 Kr.

An attempt was made to distinguish between hygroscopic water, water nclosed in cavities, and chemically combined water. An approximate determinaon of enclosed water was obtained by submitting 2–3 mm. grains to a red-heat or ½ hour, hygroscopic water having been previously removed at 110°. The mple was then finely powdered for the determination of total water. For the etermination of salts present in the enclosed water, the rock (several kg.) was round in a ball-mill and Na, K, Ca, Cl, SO_4, SiO_2 estimated in the water exact. In quartz and felspar from pegmatite were found 0·14–0·16% enclosed ater with 15–19% salts; in granites 0·13–0·40% water with 6·6–22% salts; in asalt 0·23% water with 10% salts. L. J. S.

RMAKOV (N. P.). *Determination of temperatures of formation of hydrothermal minerals by studying liquid inclusions.* Compt. Rend. (Doklady) Acad. Sci. URSS, 1944, vol. 45, pp. 202–203.

The temperatures at which bubbles disappear from liquid inclusions was deterined under the microscope in thin sections of optical baryte, fluorite, and alcite from localities in central Asia, care being taken to distinguish between rimary and secondary [M.A. **4**–185] inclusions. Results for material from ifferent cavities in the Kulikolon deposit are: for baryte 119–152° C. (mean 38°), fluorite 101–136° (122°), calcite 89–108° (101°), these being taken to be the

temperatures of formation. The order of crystallization is baryte, fluor calcite. Piezoelectric quartz from the Pamir deposit gave a range 82–220°.
L. J. S

Roy (Chalmer J.). *Silica in natural waters.* Amer. Journ. Sci., 1945, vol. 2 pp. 393–403.

A review is given of the geological and chemical literature on the state of sil in natural waters. Geologists, following L. Kahlenberg and A. T. Lincoln (18 have often regarded it to be in a colloidal state, but later chemical work sugg that it is in true solution, probably ionic. L. J. S

Kennedy (George C.). *The hydrothermal solubility of silica.* Econ. Geol., 1 vol. 39, pp. 25–36, 3 figs.

Water and silica-glass fibres heated to 200–420° C. at 300 atmospheres i stainless steel bomb of 155 c.c. capacity show that the solubility of SiO_2 in rises from near zero at 200° to a maximum of 0·20% at 360°, and falls off further rise of temperature. [M.A. **6**–347.] M. A. P

Legraye (M.). *A propos des cherts (silexites) du calcaire carbonifère.* Ann. Géol. Belgique, 1941, vol. 64 (for 1940–41), Bull. pp. B237–B242, 4 figs.

Photographs show an extensive layer of chert nodules along a bedding plan Carboniferous Limestone in province Liége. The rival theories of the formati of chert and flint from sponge spicules or by direct precipitation of colloidal sil from sea-water are discussed. L. J. S

Oakley (Kenneth P.). *An unusual variety of flint from near Burnham, Bucki hamshire.* Proc. Geol. Assoc. London, 1944, vol. 55, pp. 170–172, 1 pl.

A worked implement shows lighter coloured, pebble-like inclusions in a da grey matrix of cherty flint. The siliceous replacement of chalk pellets is suggest [M.A. **7**–509.] L. J. S

[Korzhinsky (D. S.)] Коржинский (Д. С.). Абиссофобный минерал пу пеллиит в породах горы Благодати и реки Турьи и о факторе энерг превращения.—Korjinsky (D. S.). *An abyssophobe mineral pumpell in the rocks of the mount Blagodat and the Turya river and on the factor the transformation energy.* Изв. Акад. Наук СССР, Сер. Геол. (Bull. Ac Sci. URSS, Sér. Géol.), 1944, no. 5, pp. 87–91, 1 fig. (Russian with Engl summary.)

Pumpellyite is rather abundant in the altered skarns, hornfels, and porphyri of Blagodat mountain in the Urals. It replaces garnet, scapolite, and plagiocl and is associated with prehnite, epidote, clinozoisite, and chlorite. It occurs the form of radial aggregates of monoclinic blade-shaped crystals, varying colour from bluish-green to colourless, and with α 1·692, β 1·700, γ 1·712, $57° \pm 5°$, positive, strong dispersion, $r < v$. In the Turya copper deposit pumpelly is found in partially altered porphyrites and tuffs and also in fissures in diori in association with zeolites. The formation of pumpellyite during the proces propylitization is discussed, and it is suggested that pumpellyite is a product a low-grade metamorphism at small depth. S. I. T

VARITZKY (V. A.)] Заварицкий (В. А.). Пумпеллиит в зеленокаменных породах Учалинского района на южном Урале.—ZAVARITSKY (V. A.). *Pumpellyite in the green-stone rocks of the Uchaly region at the south Urals.* Изв. Акад. Наук СССР, Сер. Геол. (Bull. Acad. Sci. URSS, Sér. Géol.), 1944, no. 5, pp. 92–97, 8 figs. (Russian with English summary.)

Pumpellyite is very common in the greenstone facies of igneous rocks in the uls. In albitophyres it occurs in vesicles together with epidote and quartz in form of radial aggregates or spherulites. Two varieties have been dis-guished: the green, with α 1·703, β 1·716, γ 1·721; and the colourless with ·681, β 1·685, γ 1·694, 2V 46–48°, positive, pleochroic. In the dacitic and lesitic porphyrites it usually replaces plagioclase in the form of minute tabular ins and it also occurs in vesicles. In basic rocks it is seldom observed, but metimes it is found in vesicles in association with quartz, chlorite, and calcite, h α 1·696, β 1·703, γ 1·716, 2V 50–65°, positive, pleochroic. The conclusion is t pumpellyite is a mineral formed at low temperature. S. I. T.

THER (Egil). *Funn av pumpellyitt i bergarter fra Oslofeltet.* Norsk Geol. Tidsskrift, 1942, vol. 21 (for 1941), pp. 294–295. (With English summary.)

Pumpellyite occurs as microscopic crystals, together with calcite, epidote, hnite, and decomposed felspar, in syenite-porphyry from Eidsfoss near Vest-l and in diabase from Bærum near Oslo. It is optically biaxial, positive, with ong dispersion $r < v$, β ($\perp$ elongation) 1·695; pleochroism, β bluish-green, α l γ colourless; γ to cleavage 30°. L. J. S.

EMMLEIN (G. G.)] Леммлейн (Г. Г.) LAEMMLEIN (G. G.). О закономерных срастаниях порфировых кварцев на грани (10$\bar{1}$1).—*On regular intergrowths of porphyry-quartz on (10$\bar{1}$1) face.* Труды Лаб. Крист. Акад. Наук СССР (Trav. Lab. Crist. Acad. Sci. URSS), 1940, no. 2, pp. 123–148, 29 figs. (English summary, pp. 146–147.)

Intergrowths of quartz crystals from quartz-porphyries at Samshvildo in orgia and Kafan in Armenia are described. On the rhombohedral faces of the ger crystals there are often triangular impressions where smaller crystals had en attached with the rhombohedral faces in contact. Four definite orientations the two isosceles triangles correspond to parallel growth and to twins on the terel, Verespatak, and Samshvildo laws. In the Samshvildo twins the faces $\bar{1}$1) and the zones [$\bar{2}$113] coincide, with a turn to the right or to the left of ° 28′ about an axis $\perp$ (10$\bar{1}$1) and an angle of 30° 40′ between the two *c*-axes; the ult is very similar to the 'Wheal Coates' twin-law [Min. Mag. **21**–375]. L. J. S.

OVÁČEK (R.) [1905–42]. *K otázce chemického vzorce uranopilitu a β-uranopilitu.* [On the question of the chemical formula of uranopilite and β-uranopilite.] Věstník Královské České Společnosti Nauk, 1942, for 1941, no. 17, 13 pp., 1 pl. (With German and French summaries.)

Detailed dehydration diagrams are given for both varieties of uranopilite from chymov, Bohemia, and Shinkolobwe, Belgian Congo, and compared with Mélon's analyses quoted by H. Buttgenbach. At 60–70° C. uranopilite loses $_2$O of its 16H_2O and changes to β-uranopilite; the anhydride is probably $O_3.SO_3$. [M.A. **6**–148.] F. S.

Kašpar (Jan Václav). *O islandském vápenci.* [On Iceland-spar.] Praha, 1
48 pp., 6 pls.

A detailed account is given of the well-known Helgustadir locality in Ice
together with a critical review of the crystallographic literature on the spa
total of 36 crystal-forms is established and their zonal relations discussed.
for calcite is $(30\bar{3}4)$, and new for the locality are π $(11\bar{2}3)$, t. $(16.0.\bar{1}6.1)$, n. (5
π. $(07\bar{7}5)$, μ. $(06\bar{6}5)$, λ. $(08\bar{8}7)$, ϵ. $(03\bar{3}5)$, z: $(12\bar{3}5)$, u: $(3.5.\bar{8}.13)$, x: (4.3.
v: $(7.4.\bar{1}\bar{1}.15)$, α: $(11.2.\bar{1}3.15)$, D: $(61\bar{7}5)$, and W: $(13.\bar{1}\bar{1}.24.2)$. Sp. gr. 2·
The succession is quartz—calcite—heulandite—stilbite. [Min. Mag. **13**–396
F.

Kunský (Josef). *K otázce stáří krápníků.* [On the question of the age of sta
tites.] Zprávy Geologického Ústavu pro Čechy a Moravu (= Vě
Státního Geologického Ústavu Československé Republiky), 1940, vol
pp. 269–280. (German translation: Zur Altersfrage der Topfsteine.)

The methods of estimating the ages of stalactites are critically revie
Estimates based on longitudinal sections are more reliable than those on tra
verse sections; and stalagmites, with their more regular development, are pre
able to stalactites. F.

Paclt (Jiří). *Ein Beitrag zur mineralogischen Nomenklatur.* Neues Jahrb. M
Monatshefte, 1944, pp. 6–7.

H. Strunz (Mineralogische Tabellen, 1941) has wrongly transposed the na
hydropilite ($CaCl_2$) and baeumlerite ($KCaCl_3$). Chlorocalcite, described
A. Scacchi (1872) as $CaCl_2$, is identical with baeumlerite (O. Renner, 1912),
the earlier name is inappropriate. [Min. Mag. **16**–354.] L. J.

Høeg (Ove Arbo). *On crusts of gypsum on the soil at Klaas Billen bay, Sp
bergen.* Kong. Norske Vidensk. Selskab. Forhandl., 1940, vol. 12, no.
pp. 111–114.

On the slope between the base of Pyramiden mountain and the shore b
patches of soil are covered with a whitish crust which chemical analysis show
be gypsum. Gypsum is wide-spread in the rocks of the neighbouring mount
and the stream-water is remarkable for its high content of dissolved inorg
matter, especially CaO and SO_3. W. C.

Oftedal (Ivar). *Om regelmessig sammenvoksing av krystallindivider.* No
Geol. Tidsskrift, 1942, vol. 21 (for 1941), pp. 272–289, 11 figs.

Regular intergrowths of different minerals are mentioned, and a study is m
of the parallel growth of alkali halides on each other and on mica in relatio
their lattice spacings. L. J.

Oftedal (Ivar). *Om betingelsene for oktaedrisk delbarhet hos vismutrik blyglan
On the conditions causing octahedral parting in galenas rich in Bi.* No
Geol. Tidsskrift, 1943, vol. 22 (for 1942), pp. 62–68. (With English summa

Galena from various localities in Norway contains 0·35–2·4% Bi and 0·
1·0% Ag. When there is an excess of Bi (1·0–1·8%) over that required
$BiAgS_2$ the galena has an octahedral cleavage with the total or partial disappe

ıce of the cubic cleavage. Probably $BiAgS_2$ [M.A. 7–104, 354] is isomorphous ith galena, and the excess Bi enters into vacant metal positions. L. J. S.

VALHEIM (Aslak). *On the spectrochemical determination of vanadium in iron ores and slags.* Norsk Geol. Tidsskrift, 1942, vol. 21 (for 1941), pp. 245–267, 7 figs.

Two methods are described. (1) Comparison of the intensities of the V-lines 85 and 3056 with those of the Fe-lines 3205 and 3055, with concentration-libration curves, allowance being made for the effect of the presence of CO_3, Al_2O_3, plagioclase, and olivine on the intensity of the V-lines. (2) Addi-n of 10% Cr_2O_3 and comparison of the V 3056 line and Cr 3034 line; in this se other substances present have little effect. L. J. S.

UND (Lars). *A contribution to the determination of manganese in silicates.* Norsk Geol. Tidsskrift, 1942, vol. 21 (for 1941), pp. 268–271, 1 fig.

The usual colorimetric method is unsatisfactory with more than 0·5% Mn. In e solution Mn^{2+} is oxidized to Mn^{7+} with $K_2S_2O_8$ and $AgNO_3$ as catalyser, and PO_4 added to make the oxidizing process irreversible. Mn^{7+} is then titrated ith $FeSO_4$, using diphenylamine as indicator with sharp colour change dark ue-violet to light green. L. J. S.

RIP (Erland) & ÖDMAN (Olof H.). *The telluride-bearing andalusite-sericite rocks of Mångfallberget at Boliden, N. Sweden.* Årsbok Sveriges Geol. Unders., 1942, vol. 36, no. 4 (Avhandl., ser. C, no. 447), 21 pp., 11 figs. Price 1 Kr.

The relations here are very similar to those at the Boliden mine, 2 km. to the uth [M.A. 8–311]. Andalusite-corundum-sericite-rock (SiO_2 18·50, Al_2O_3 70·23, $_2O$ 3·85, &c.), andalusite-sericite-rock, andalusite-schist, &c. have been derived om the adjacent quartz-porphyry (analysis given). The ore-minerals in sparing nount include tellurobismutite, tetradymite, tetrahedrite, pyrite, &c., and some hers not identified. The antimony-bearing tellurobismutite gave on analysis by Berggren Te 48·92, Se 0·58, Bi 46·40, Sb 3·92, As 0·10, S 0·13, Fe 0·03, Ag 0·02 =)0·10, sp. gr. 7·061, $(Bi,Sb)_2Te_3$. L. J. S.

ILLWELL (F. L.). *The occurrence of tellurides at Norseman, Western Australia.* Proc. Australasian Inst. Mining & Metall., 1944, new ser., no. 135, pp. 1–8, 4 pls.

Minute grains of altaite, hessite, and sylvanite, with pyrite, chalcopyrite, ende, galena, and native gold, usually along sericite seams in quartz, are shown ı polished surfaces of gold ore. L. J. S.

ADDING (Assar). *Barytes and celestite in the sedimentary rocks of Sweden.* Kungl. Fysiograf. Sällsk. Lund Förh., 1939, vol. 8 (for 1938), no. 8, pp. 1–21, 11 figs.

ALMQVIST (Sven). *On the solubility relations of barium sulphate.* Ibid., pp. 21–27 (appendix).

Small (3–8 mm. long) fusiform crystals of baryte elongated along the *b*-axis, id resembling grains of corn, are thickly scattered at random in certain bands Cambrian alum-shale in Scania; in other bands there are radiating nodules

(up to 20 cm.). Larger (10 cm. long) fusiform crystals (011), (133), (111) oc in Ordovician limestone (containing BaO 0·84%); some of these have been solved out leaving hollow casts. Celestine is of rare occurrence in the chalk Scania.

The slight solubility of $BaSO_4$ in water (2·30 mg. per litre), or even the slig increased solubility in the presence of chlorides, will not account for this mi tion and re-solution of baryte. In the presence of carbonated water w $CaH_2(CO_3)_2$ it is suggested that $BaSO_4$ is changed to $BaCO_3$; and the solubilit $BaH_2(CO_3)_2$ is greater than that of $CaH_2(CO_3)_2$. L. J. S.

Rankama (Kalervo). *Chalcocite from Merijärvi, Middle Pohjanmaa.* Com Rend. Soc. Géol. Finlande, 1941, no. 14 (Bull. Comm. Géol. Finlande, no. 1 pp. 84–89, 1 pl.

Minute grains of orthorhombic β-chalcosine occur as replacements of pyrit an altered quartz-diorite. L. J. S.

Legraye (M.). *Chalcosine et covelline du Maniema (Congo Belge).* Ann. Géol. Belgique, 1941, vol. 64 (for 1940–41), Bull. pp. B7–B12, 4 figs.

Blocks of malachite when broken open show remnants of chalcosine alter through covelline to malachite along the cleavage. The chalcosine is wh bluish, or reddish, and is mostly optically isotropic. It does not show the granul structure of secondary chalcosine, and resembles the primary chalcosine fr Tsumeb, South-West Africa [M.A. **1**–158]. L. J. S.

Fornaseri (M.). *Magnesite di Serra das Eguas (Bahia, Brasile).* Rend. Soc. M Ital., 1941, vol. 1, pp. 60–65, 1 fig.

Rhombohedra ($10\bar{1}1$) with narrow ($11\bar{2}0$) gave for the cleavage angle 72° 29′ 5 $a : c = 1 : 0{\cdot}8097$; sp. gr. 3·015, ϵ 1·5145, ω 1·7044 (Na; values given for six ot wave-lengths); analysis CO_2 51·93, MgO 46·62, CaO 0·43, FeO 0·56, MnO 0·12 99·66, $MgCO_3$ 98·14%. The following values are deduced for the pure miner [M.A. **1**–10, **2**–188]:

	$CaCO_3$.	$MgCO_3$.	$MnCO_3$.	$FeCO_3$.
ϵ	1·486	1·509	1·597	1·633
ω	1·658	1·700	1·817	1·875
Sp. gr.	2·715	2·96	3·70	3·89

L. J. S.

Grill (E.). *Bavenite: composizione, chimica, diffusione.* Rend. Soc. Min. It 1941, vol. 1, pp. 97–107, 2 figs.

New analyses of bavenite from Baveno, I, radially fibrous spherules, G. Pagliani, II, small yellowish saddle-shaped masses, by T. Bianchi, show t presence of beryllium and agree with $H_2BeAl_2Ca_4(SiO_3)_9$: SiO_2 56·19 (57·4 Al_2O_3 12·49 (12·08), BeO 3·12 (2·48), CaO 25·12 (25·76), H_2O 2·74 (3·0 totals '99·47' (100·72). Optical orientation $\alpha = c$, $\beta = b$, $\gamma = a$, $\gamma - \alpha$ 0·00 0·008. Other localities in Piedmont are Beura and Villa d'Ossola in V d'Ossola, where bavenite occurs in gneiss as white porcellaneous masses or silky fibres. [M.A. **5**–230, 474; Min. Mag. **25**–495.] L. J. S.

ELIANI (G.). *Gadolinite di Baveno.* Rend. Soc. Min. Ital., 1941, vol. 1, pp. 129–135, 1 fig.

Gadolinite in the granite of Baveno, Piedmont, is of two types. (*a*) Greenish-ck crystals, 1–5 mm., on orthoclase, slightly altered, optically isotropic, racters variable (H.∼ 7, sp. gr.∼ 4, n∼ 1·7) [M.A. 7–115]. (*b*) Anisotropic stals, 1·5 cm., of prismatic habit showing seven crystal-forms, with albite; rose-coloured core (sp. gr. 3·200, n 1·545) of these crystals gave analysis I, the pale greenish-yellow outer portion (n 1·700) gave II.

SiO_2.	$(Ce,Di,La)_2O_3$.	$(Yt.Er)_2O_3$.	Fe_2O_3.	FeO.	BeO.	CaO.	MgO.	H_2O.	Total.
24·74	6·49	33·32	13·30	—	5·42	2·58	trace	13·88	99·73
21·74	43·21		10·42	3·44	5·10	4·56	0·65	10·48	99·60

L. J. S.

ETOLANI (Mario). *La datolite della Guardiola di Rossena.* Periodico Min. Roma, 1940, vol. 11, pp. 339–352, 1 pl.

Datolite occurs with prehnite in cavities in diabase at this locality in Emilia. crystals (2 mm.–2 cm.) are colourless and transparent or white and opaque. iometric measurement of 17 crystals showed the presence of 39 crystal-forms which (801), (045), (338), (553), ($\bar{2}25$), ($\bar{3}38$), ($\bar{7}74$), and ($\bar{4}61$) are new ($a:b:c$ = 329 : 1 : 0·6345, β 89° 51′). Optical determinations are given for the lines D, and F; for D, α 1·6241, β 1·6525, γ 1·6690, 2V 74° 11′; $2V_C$ 74° 52′, $2V_F$ 12′; $c:\gamma$ = 1° 48′–2° 6′ white light. Analysis gave SiO_2 37·08, B_2O_3 21·90, O_3 0·52, Fe_2O_3 0·17, MgO trace, CaO 34·61, H_2O 5·78 = 100·06. L. J. S.

ETOLANI (Mario). *La datolite della formazione ofiolitica di Rossena.* Periodico Min. Roma, 1941, vol. 12, pp. 299–309, 3 figs.

Datolite crystals from diabase on Monte Campotrera, near Reggio in Emilia A. 2–529] (1 km. from the locality mentioned in the preceding abstract), show crystal-forms, of which ($\bar{3}02$), ($\bar{3}04$), ($\bar{1}08$), (034), ($\bar{1}15$), ($\bar{3}.3.10$), and vicinal 12.11) and (0.13.7) are probably new. For red light α 1·6212, β 1·6485, γ 1·6653. phs show the frequencies of 50 crystal-forms and combinations of forms from two localities. L. J. S.

ANASERI (M.). *Berthierite nella miniera Marchi di Ravi* (*Gavorrano*). Rend. Soc. Min. Ital., 1941, vol. 1, p. 59.

Radiating aggregates of fine needles gave S 29·70, Sb 56·50, Fe 12·85, Mn 0·22, 0·28 = 99·55. L. J. S.

NTA (Francesco) & DE CINDIO (Alma). *Studio della cosidetta steatite di Serra S. Bruno* (*prov. di Catanzaro*). Periodico Min. Roma, 1941, vol. 12, pp. 1–32, 1 pl., 2 text-figs.

The so-called steatite or indurated talc from Calabria, formerly used as a refrac-y material, consists of a mixture of muscovite (sericite) and chlorite with some le and zircon. L. J. S.

NTA (Francesco) & DE CINDIO (Alma). *L'eterogeneità dei cristalli di leuchten-bergite di M. Schischimsk* (*Urali*). Periodico Min. Roma, 1941, vol. 12, pp. 33–48, 1 pl.

The large crystals of leuchtenbergite from Shishimsk are found to consist of an rgrowth of two chlorites with inclusions of magnetite and brookite. L. J. S.

Rossetti (Vasco). *Scorodite di Genna s'Olioni (Gonnosfanadiga, Sardegn*
Periodico Min. Roma, 1941, vol. 12, pp. 433–435.

A green concretionary crust on limonite, evidently a decomposition produc
mispickel, and agreeing in optical characters with scorodite, gave As_2O_5 49
Fe_2O_3 34·19, H_2O 15·32, insol. 1·94 = 100·65; sp. gr. 3·189. L. J. S

Rodolico (F.). *Brookite di Calafuria presso Livorno.* Periodico Min. Roma, 19
vol. 13, pp. 15–20, 1 pl.

Crystals ($7 \times 3 \times \frac{1}{2}$ mm.) of brookite attached to quartz crystals occur in ca
ties in sandstone. They are yellow with darker brown patches, and show
forms *a b c y m l? e z* [Dana's 1892 letters]. L. J. S

Rossetti (Vasco). *Su una köttigite nichelifera di Punta Pira Infer*
(*Gonnosfanadiga–Sardegna*). Periodico Min. Roma, vol. 13, 1942, pp. 20
207.

A rose-coloured mineral from the Arburese Ni–Co mine consists of minute la
with $\gamma' : c = 37°$ and gave As_2O_5 34·63, NiO 17·23, CoO 11·97, ZnO 8·54, Fe
0·83, H_2O 22·55, insol. 4·23 = '99·88', agreeing with $R_3(AsO_4)_2.8H_2O$. The prese
of even so minor an amount of zinc is considered to justify the reference of
mineral to köttigite. Another mineral as pale green fibres with $\gamma' : c = 35°$ ga
As_2O_5 35·18, NiO 28·40, CoO 7·23, MgO 2·47, H_2O 23·12, insol. 3·60 = 100·
and is referred to annabergite. L. J. S

Bellanca (Angelo). *Sulla titanite di Isernia (Campobasso) e sulla costituzio*
chimica delle titaniti in genere. Periodico Min. Roma, 1942, vol. 13, pp. 20
216.

Crystals (0·7 × 0·1 mm.) of sphene from this locality are almost colourless a
are elongated along the *a*-axis; forms *a b c m S n η t l* [Dana's 1892 letters]. Op
axial plane (010), $\gamma : c = 51°$, 2V $55\frac{1}{2}°$, sp. gr. 3·462. Analysis gave SiO_2 30·
TiO_2 40·16, ZrO_2 0·02, Al_2O_3 1·65, CaO 28·46 = 100·32, and spectroscopic tra
of Mg, Yt, Ce, (Hf?). The general formula suggested is $[X^{CIV}O_4 \mid (O,OH,F)]Y^{CV}$
L. J. S

Morgante (S.). *La titanite a terre rare del granito pegmatitico di Quoscesc*
Periodico Min. Roma, 1943, vol. 14, pp. 13–33, 1 fig.

Crystals (2 cm.) of sphene from pegmatite at Quoscescer, NE. of Harar, Ab
sinia, are black and opaque (translucent and red at the edges), and are elonga
along the edge (111)/(1$\bar{1}$1). Goniometric measurements gave $a : b : c = 0·75$
1 : 0·8526, β 59° 57′; forms *n a c m η t S W* [Dana's 1892 letters]. Sp. gr. 3·
α 1·90, β 2·04, $\gamma - \alpha$ 0·14, $\gamma : c = 35–36°$, 2E 69–71°; pleochroism α and β cl
yellow, γ maroon-red. Analysis gave SiO_2 29·32, TiO_2 35·26, ZrO_2 trace, Ce
2·98, Yt_2O_3 1·53, Al_2O_3 1·02, Fe_2O_3 1·34, FeO 1·05, MnO 0·03, MgO 0·36, BaO 0·
CaO 25·72, Na_2O 0·14, K_2O 0·07, P_2O_5 0·06, H_2O+ 0·64, H_2O- 0·18 = 99·74, a
spectroscopic traces of Cu, V, As, Sn, Sr. Formula $ABSiO_4X$, where A is
and all cations with atomic radii 0·67–1·35 Å., B is Ti and cations with atom
radii 0·57–0·67 Å., and X = O,OH,F. A description with chemical analysis
given of the pegmatite. L. J. S

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Printed in Great Britain by JOHN JOHNSON, at the University Press, Oxford

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